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TWO CASES OF OPERATION FOR TRAUMATIC EPILEPSY; IN ONE OF WHICH THE LATERAL VENTRICLE WAS WIDELY OPENED; IN THE OTHER, AN ABSCESS OF THE BRAIN, CAUSED BY A PORTION OF BONE BEING EMBEDDED IN THE BRAIN FOR FOURTEEN MONTHS, WAS EVACUATED.

By W. W. Keen, M.D., LL.D., F.R.C.S. (Hon.),
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Case I. *Traumatic epilepsy; wide opening of the lateral ventricle; recovery; recurrence of epilepsy.*—R. S., aged nineteen years, from Cadwallader, Fayette County, Pennsylvania, was admitted to the Jefferson Medical College Hospital, April 14, 1901, at the instance of his physician, Dr. Eustan. His father died after an operation for stone in the bladder; his mother and three brothers and sisters are living and well. He had measles and whooping-cough in childhood and diphtheria in March, 1901. In 1892 he was thrown from a horse, striking on the right side of his head over the occipital and posterior portions of the parietal bones. There was a large lacerated wound of the scalp. The bone was fractured and some of it removed. One year later a piece of necrosed bone was discharged. He is said to have been unconscious for nine days, but when he recovered consciousness there was no paralysis either of motion or of sensation. Seven years later, in March, 1899, he had his first epileptic convulsion (*grand mal*). He has had a number of attacks since then. They are preceded by an aura in which his entire head seems to become filled with blood. In addition to these attacks of *grand mal* he has had very many more of *petit mal.* During the attacks he says that his head always turns toward the left. The convulsions, however, do not begin in any one part of the body, but are universal. In the two years since the first attack he has had about fifteen severe ones in addition to a large number of slighter ones. The last attack was three months ago.

The examination of the eyes, by Prof. de Schweinitz, was negative. The urine was clear, of amber color, specific gravity 1024, reaction acid, urea 1.8 per cent. It contained no albumin or sugar. The microscope showed amorphous urates, a few epithelial cells, and a few leucocytes.

In view of the fact that nothing was done at the time of injury excepting to remove a piece of loose bone, and of the relatively recent beginning of the attacks of epilepsy, after consultation with Prof. Dercum I decided to do an exploratory operation.

Operation, April 17, 1901. I first turned down a large flap of scalp with the periosteum and exposed two openings in the skull, the larger one of which (3 x 1.5 cm.) I had already recognized through the scalp. The smaller one was one-quarter the size of the first. I first removed the bridge of bone between the two openings and enlarged the entire opening by the rongeur forceps until it was 10 cm. long by 3.5 cm. wide, the long axis being antero-posterior. I then divided the dura, which was thin. Immediately below it in some loose connective tissue ran a vessel of considerable size, which from its situation and direction I judged was the posterior branch of the middle meningeal. This was tied with two catgut ligatures and cut. Below the dura and connected with it by some trabeculæ of loose fibres of connective tissue, and at a depth of about 1 cm. below the dura, was a thin, dark-colored sac, apparently the wall of a cyst. On opening this a considerable amount of fluid (probably several ounces) escaped. I doubled a bit of silkworm-gut like a hairpin, and by this means measured the cavity, finding that I could introduce the silkworm-gut for a distance of 10 cm. I then enlarged the opening in the supposed cyst in order to inspect the character of the wall lining it, and, quite to my astonishment, found that I had opened widely the lateral ventricle, the fornix, and choroid plexus, and the cornua in the floor of the ventricle, all being in full view. I was very naturally astonished, because I had not thus far seen anything of the cerebral cortex, much less any white matter under the gray. Though I had often punctured the lateral ventricle, I confess that when I was confronted by a widely opened ventricle I was very much perplexed how to deal with it. I finally decided, as there would be considerable oozing of blood into the ventricle, that it would be wiser to drain for a time, and accordingly I first inserted a small rubber drainage-tube, and alongside of it a gauze wick, with instructions to the house surgeon, Dr. Jiminez, to remove the rubber tube in four or five hours. The gauze I intended to remove the next day, but he was directed, in case of any serious symptoms arising in the interval, to remove all drainage at once and close the wound. I was rather surprised to find that the escape of so large an amount of cerebro-spinal fluid did not produce any symptom whatever. After my clinic was over, though no symptoms had arisen, I decided that it would be wiser to remove the drainage-tube immediately, as I was afraid of the continuous escape of the cerebro-spinal fluid. Accordingly, after the tube had been in place two hours, the house surgeon removed it. The iodoform gauze I removed the next day. As soon as the gauze was removed there was a jet of bloody fluid which spurted to a distance of perhaps 20 or 25 cm.; in all I estimated that between four and six ounces of fluid were lost before I could check it by pressure. My fear was that, as in a case of hydrocephalus, the loss of cerebro-spinal fluid would probably cause convulsions which might possibly even prove fatal. Nothing, however, occurred; even his pulse rate did not change.

On the sixth day after the operation, finding the flap bulging a good deal and the patient complaining of severe headache, I evacuated two or three ounces of cerebro-spinal fluid by means of a pair of forceps slipped under the flap. The fluid this time was almost entirely clear. On the seventh day he was up and out of bed. The wound required no further interference and healed by primary union. His temperature on the day after operation rose to 102.4°, and the next morning to 103°. It then fluctuated between 101° and 102° until the eleventh day, when it was down to the normal and remained so. After the evacuation of the fluid on the sixth day his headache disappeared. On May 7th, the twentieth day, the severe headache returned, and he was markedly drowsy, without, however, any bulging of the flap to indicate any increased intracranial pressure. At 4 A.M. of May 8th, and again at 11.45 A.M. and 12.10 P.M., he had three severe epileptic attacks, during which the entire body was scarlet. The hands and arms showed marked convulsive movement more than any other part of the body. On May 10th he left the hospital for his home in excellent physical condition. He had had no later epileptic attacks up to May 24th.

REMARKS. In an elaborate paper presented at the International Medical Congress in Berlin, in 1890, but of which only a résumé was read and published, I collected all the cases then recorded in which the lateral ventricle had been opened. Unfortunately, although I handed it in person to the secretary of the surgical section, it was lost, and I had no copy. I have never been able to spare the time to rewrite it. At the time I was greatly surprised to find that that which had usually been considered a fatal accident was, relatively speaking, harmless.

Before the operation upon the present case, I had already opened, in other cases, the ventricles upon both sides and irrigated the brain from side to side, drained the ventricles for a short time, and punctured them to relieve intracranial pressure a number of times, but I had never laid it widely open, almost as widely as one opens a box by removing the lid. Hence, I was in no little perplexity to know just what to do in this case. The result would seem to prove that I decided rightly, viz., to drain for a time and then to close the wound. I was surprised to see how little effect, in fact I might say no effect, was produced by the escape of so large a quantity of the cerebro-spinal fluid. Whether an adult is less susceptible than a child and a relatively normal person than a hydrocephalic, I do not know, but certainly in this case the escape of the fluid was absolutely without result, saving that which was beneficial in relieving the severe headache.

The cause of the very unusual condition which was found in the brain is quite obscure to me. There was absolutely no cortex and no white substance between the posterior half of the lateral ventricle and the membranes. I use the pleural because I suppose that the thin sac, which was 1 cm. inside the dura, was probably the pia. The space between the dura and the pia was occupied by the trabeculæ of connective tissue in the shape of thin threads, in the meshes of which was considerable cerebro-spinal fluid.

Whether the case was one of acquired porencephaly or whether there was simply destruction of the cerebral tissue between the ventricle and the dura at the time of the accident, or by absorption later, I cannot guess. The young man's mental condition when he entered and when he left the hospital was entirely normal. There was no paralysis, and, moreover, in spite of the extensive and deep destruction of the brain tissue there was no hemianopsia. From the operative point of view his recovery was very gratifying. The brief later history would seem to show that probably there will be no benefit so far as the epilepsy is concerned.

CASE II. *Gunshot wound of the head followed by hemiplegia, traumatic epilepsy and abscess of the brain, due to the embedding of a portion of the bone in the brain for fourteen months.*—H. M. L., aged twenty-one years, of Pittston, Pennsylvania, was admitted to the Jefferson Medical College Hospital, March 24, 1901. His family and personal history have no bearing on the case. He was a private in the Eighth United States Cavalry in Cuba. In February, 1900, while acting as a marker at target practice, he was struck in the head, on the right side of the vertex, by the ball from a Krag-Jorgensen rifle. The ball passed completely through the head, emerging on the other side, and must have passed either directly through or immediately below the superior longitudinal sinus. Possibly the ball passed just above the sinus, destroying the bone, but this seems to be a less likely probability. He remained unconscious for six weeks, at which time his epilepsy began. This was most marked on the left side of the body, including the face, the attacks recurring every three or four weeks. He was not unconscious during the attacks. At the end of March, 1900, an operation was done, a portion of bone being removed. Later, at Santiago, a second operation was done, and a piece of bone inserted to close the opening. In November, 1900, he returned to the United States. His general condition was much improved, and he was able to walk, although the left side of the body was very weak. The epileptic attacks now began to increase in frequency, occurring as often as every six or eight days. They were accompanied with intense pain in the left leg and arm, both of which extremities became markedly weak. In addition to this he suffered from almost constant pain in the back of his head. On January 16, 1901, he was operated on for a third time, the plate of bone being then removed. Since this operation only one epileptic attack has occurred, although he has had threatenings of several. The pain in the back of his head and the paralysis of the left side were not relieved.

On admission his general condition was only fair, his appetite was poor, and the bowels constipated. The left leg and arm and the left side of the face were paralyzed, accompanied by a spastic condition of the parts involved, evidently due to a lesion of the motor area. Prof. Dercum examined him on March 27th, confirmed the observations made, and noted also that there was no Babinski reflex; that the knee-jerk on the right side was slightly exaggerated; that there was no sensory loss. He concurred with me as to the desirability of an exploratory operation. The urine was turbid, amber color, specific gravity 1022, reaction acid, with a slight trace of albumin, no sugar, urea 1.3 per cent. The microscope showed calcium phosphates, amorphous urates, and a few leucocytes; no blood or casts. On admission he was unable to walk, but mentally was fairly clear. From day to day, however, he became more and more somnolent. The temperature, which had risen considerably, had almost immediately fallen to a little below the normal, and remained there. Moreover, his headache and his epilepsy were increasing in severity. It seemed, therefore, probable that there was a cerebral abscess and that immediate operation should be done. The opening in the top of his skull was 5 x 3 cm., about two-thirds of it being to the right of the middle line, the axis of the opening being almost directly transverse. The superior longitudinal sinus would be a little to the left of its middle and at right angles to its axis. On March 25th Dr. de Schweinitz examined his eyes, with the following results:

O. D., pupil reactions normal, nearly round disk. A spot of white tissue on the nasal side, probably congenital; fundus in good condition. O. S., a similar condition, and disk slightly congested. He has a history of having had diplopia, but at present there is neither paralysis of the ocular muscles nor hemianopsia.

Operation, March 30th. I made a large horseshoe-shaped flap on the right side, the highest point of the curve being just to the left of the middle line. Without much difficulty I dissected away the flap from the dura. As soon as the dura was exposed it bulged very distinctly through the opening. Through the dura a hard mass about the size of the last joint of the finger was felt, about the nature of which I was very uncertain. I then enlarged the opening in the bone about 1 cm., opened the dura parallel with the bone, and turned back the flap, the base of the flap in the dura being toward the middle line, so as not by any accident to open the sinus or the parasinoidal spaces. The hard mass above referred to, which was now found to be about 2.5 cm. in diameter, lay in the brain just at the upper end of the fissure of Rolando. On incising the mass to discover its character the knife impinged on a hard, rough substance which I judged to be possibly a portion of the ball, but more likely a piece of bone. I then was able, partly with my finger and partly with a scoop, to remove the entire mass, finding it to be 4 cm. in depth. On laying it open a fragment of bone, rather less than the size of the last joint of my forefinger, was found in its interior, the hard mass being made up partly of the bone and partly of the hard fibrous tissue in which it was encysted. On inspecting the bone one side of it showed the serrations of the sagittal suture; evidently it had been driven into the brain at the time of the accident, in February, 1900, and had remained embedded in the bone nearly fourteen months. At the bottom of the cavity left by the removal of the bone and its surrounding tissue, I evacuated an abscess which contained about one-half ounce of pus. From the surface of the brain to the bottom of the abscess was 7 cm. Although I feared from the position and depth of this cavity that it communicated with the lateral ventricle, I could not establish the fact, and think that the ventricle most probably escaped. After washing out the cavity with normal salt solution I packed a little iodoform gauze into it, and in closing the wound led the gauze out obliquely under the flap instead of making an opening in the flap directly over the gauze, my object being to avoid, if possible, a fundus cerebri by the oblique drainage.

After the operation the temperature usually fluctuated between 97° and 99°. The packing was removed on the second day, and a small bit of gauze inserted again obliquely for 2.5 cm. under the flap. This was removed on the fourth day. On April 10th, the eleventh day, the temperature suddenly rose to 100°. A pair of forceps was inserted under the flap evacuating a few drops of pus, when the temperature again fell to between 97° and 98°. On April 14th, the fifteenth day, the temperature again rose to 101.4°. After the evacuation of a few drops of pus the temperature again fell to between 97° and 98°, which seemed to be possibly his usual temperature. He went home on May 8th. Four days after the operation he could move his left leg, and about the same time motion returned in the left arm. His use of these extremities steadily gained, so that on April 20th, the twenty-first day, he was out of bed and could walk quite well, although the left ankle was still weak. When discharged, on May 8th, the wound had been entirely well for a number of days. He occasionally suffered from moderate, but never from severe, headache. His general health was perfect, both physically and mentally, although for several days after the operation he had been almost entirely unconscious.

REMARKS. Perhaps the only remarks necessary in this case are to point out the fact that at three operations by some accident the portion of bone embedded in the brain tissue had not been discovered; that it had produced an abscess over a year after the accident is also noteworthy; and that it was not a bit of the bone plate inserted at one of the operations, but was a portion of the original bone driven into the brain at the time of the accident was proved by the serrations of the sagittal suture. It is entirely too early to predict anything as to his epilepsy.

PRIMARY TUBERCULOSIS OF THE PERICARDIUM.*

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TUBERCULOSIS of the pericardium presents itself (*a*) in the form of scattered miliary tubercles; (*b*) as a tuberculous infiltration, with great thickening of the pericardial layers; or (*c*) as a serous, serofibrinous, purulent, or hemorrhagic pericarditis. In miliary tuberculosis the nodules are found most plentifully near the base of the heart, or on the parts reflected upon the great vessels. The process is, as a rule, merely an incident in a general tuberculosis, and possesses no clinical importance. The tuberculous infiltration is either associated with abundant serofibrinous exudation or with more or less extensive cohesion of the pericardial surfaces, and not infrequently with great thickening of the layers and complete obliteration of the sac. The heart then looks as if ensheathed in a cuirass (Merklen[1]). On cursory, naked-eye examination the appearances are often not in the least characteristic of tuberculosis. Sometimes, if the process is recent, a careful separation of the layers may reveal here and there miliary tubercles or larger cheesy conglomerates; but in old cases of pericardial symphysis the familiar picture of tuberculosis may be so completely obliterated that the most careful inspection with the unaided eye fails to reveal the true nature of the process. It is only the microscope that under these circumstances can definitely demonstrate the tuberculous character of the pericardial disease. In rare instances, as in one reported by Kast,[2] tuberculosis produces a purulent pericarditis. A very unusual case is also recorded by Eichhorst.[3] The pericardium was the seat of three ulcers that had all the appearances of tuberculous ulcers, such as are seen in the intestine. In many instances the fluid is hemorrhagic. This was so in the remarkable case of Musser,[4] in which the pericardium contained sixty-four ounces (two litres) of blood. In the analogous case of Hirtz[5] the sac was filled with bloody fluid, amounting to nearly three litres (2790 grammes).

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* A paper, somewhat amplified, read before the Pathological Society of Philadelphia, December 27, 1900.

From the point of view of etiology, we may divide tuberculosis of the pericardium into the following forms:

1. That which is a part of a general miliary tuberculosis.
2. That associated with general serous membrane tuberculosis (tuberculous polyserositis).
3. That due to extension from neighboring organs, as the lung or pleura, the mediastinal and peribronchial lymph glands, the bones (vertebræ, sternum, ribs), and the myocardium.
4. That developing independently.

The first needs no special consideration, as the pericardial tuberculosis is entirely subordinate to the terminal systemic infection. Pericarditis as a part of general serous membrane tuberculosis is not common. More often the pleura and peritoneum are involved together, the pericardium escaping, but in rare instances all three serous membranes are diseased. The tuberculosis in these cases presents itself either as an acute miliary tuberculosis or as a chronic fibrous process.

The majority of cases of well-marked pericardial tuberculosis are the result of extension from neighboring tuberculous foci—most frequently from the mediastinal and peribronchial lymph glands. Weigert,[6] to whom we owe the demonstration of this fact, showed that the pericardial disease, as a rule, has its origin from lymph glands situated on the anterior layer of the pericardium, in the anterior mediastinum, or from those found at the point of reflection of the pericardium. In the case of Kast,[7] previously mentioned, a gland belonging to the group placed about the aorta and the pulmonary veins, near the posterior surface of the pericardium (the sub-bronchial glands of Baréty[8]), had perforated into the pericardial sac.

Ordinary pulmonary tuberculosis does not often lead to pericarditis. Leudet[9] found it only eight times in 299 autopsies. In the experience of Willigk[10] it was still rarer—eleven times in 1317 autopsies in phthisical cases. Louis[11] found it three times in 112 cases.

In the presence of well-marked tuberculosis of any of the neighboring organs we should always suspect an associated pericarditis, particularly if obliterative, to be tuberculous in origin; but in the absence of well-marked tuberculous disease elsewhere there is frequently nothing to call attention to the possibility that a pericarditis in a given case may be tuberculous. Hence it is probable that cases of tuberculous pericarditis are often recorded as simple forms of pericardial inflammation. Some of these may belong to the fourth group—that of primary tuberculous pericarditis.

In the case which I have the honor to report the appearances at autopsy were not at all suggestive of tuberculosis, yet the microscope revealed lesions typical of that disease. The patient was under my care at the Philadelphia Hospital during the past summer, and on the termination of my service passed into the hands of my successor, Dr. S. Solis-Cohen, with whose kind permission I make this report.

The man was thirty-two years of age, white, of healthy family, an iceman by occupation. He had led a very intemperate life, but had never had any infectious disease, with the exception of occasional colds. Ten days before admission, while on a debauch, he was seized with pains in the shoulders, chest, and back, with cough and headache, and these were the symptoms upon his entrance into the hospital, May 22, 1900.

Apart from some coarse râles over both lungs, posteriorly, nothing abnormal was noted except rapid breathing and feebleness of the heart sounds. It is particularly stated in the ward notes that no murmurs were present. Five days after admission a friction sound was discovered.

When I examined the patient on June 1, 1900, I found him to be a well-nourished, robust, rather irritable man, with a very florid complexion. There was a loud, rasping, superficial, to-and-fro friction sound over an area considerably larger than a dollar in the region of the third and fourth left intercostal spaces within the nipple line (Fig. 1). The friction was not palpable. There was also a pleural effusion on the left side, over which bronchial breathing could be distinctly heard. The intensity of the friction sound varied markedly from day to day. On June 3d it was exceedingly loud and galloping; on the 6th its area of audibility had shrunk to the size of a half-dollar just above the apex (Fig. 2); three days later it could be heard only at the base, in the pulmonary area; on June 15th the friction sound had returned in all its intensity, and could be heard to within one and one-half inches of the suprasternal notch above; to the left to beyond the left nipple line; below as far down as the costal border; and to the right as far as the right parasternal line (Fig. 3). The pulse was rapid and very small, feeble, and compressible. The hands were cold and bluish. The apex-beat could be neither seen nor felt. Percussion showed the cardiac boundaries to extend above to the third rib; on the right, to the midsternal line; on the left, to just outside of the nipple line, and below, to the fifth interspace. Despite the pleural effusion there was no difference between the two sides of the chest on mensuration.

Gradually the friction sound disappeared, but the patient remained weak, and his pulse was feeble and rapid. This feebleness of the pulse was one of the striking features throughout the patient's illness. He often insisted upon getting up out of bed, but always became very short of breath and was forced to lie down again. His disposition was curiously morose and peevish, and his face constantly wore an anxious expression.

From June 27, 1900, onward the friction sound remained in abeyance. There was not then, nor at any other time, any endocardial murmur. The sounds were very feeble at the apex, but quite loud at the base. There was no systolic retraction of the interspaces or of the lateral wall of the chest, nor was the pulsus paradoxus noted. The apex-beat could not be detected either by inspection or by palpation. The veins of the neck were not distended. The temperature ranged from normal to 101°, with occasional drops to below normal. The urine contained a trace of albumin, a few hyaline casts, and leucocytes, and had a specific gravity of 1020.

FIG. 1.

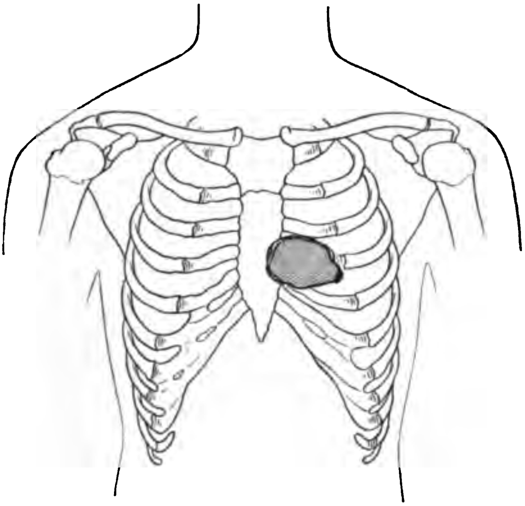
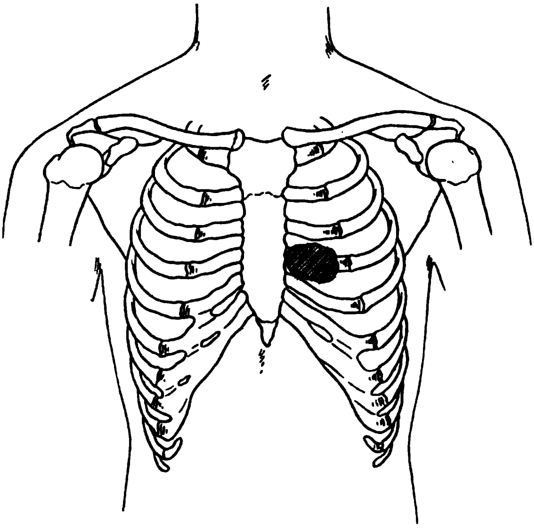


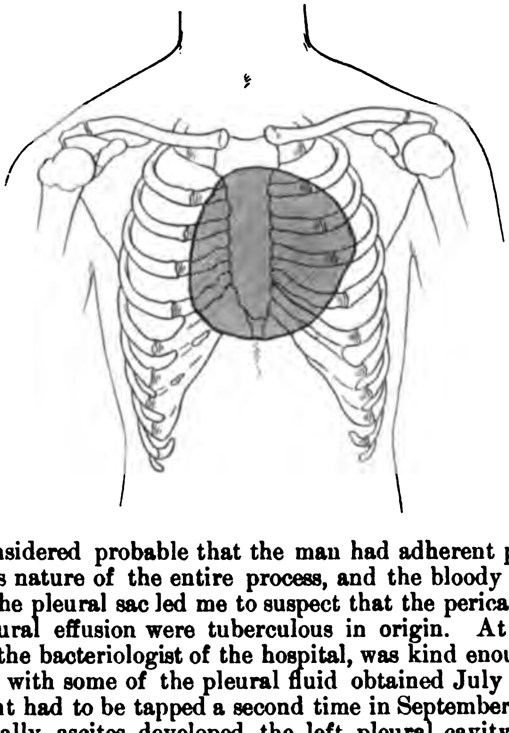
FIG. 2.



On July 11, 1900, the left pleural cavity was tapped, and a quart of bloody fluid withdrawn. This fluid was examined by Dr. Behrend, of the resident staff. It had a specific gravity of 1012, and was neutral in reaction. Microscopical examination revealed blood-corpuscles and some flat cells, but no bacteria. On the addition of nitric acid the fluid became solid from the precipitation of albumin. Sugar was absent.

After the disappearance of the friction sound the man did not improve, and the diagnosis lay between adherent pericardium and pericardial effusion. The area of cardiac dulness was not changed in shape, although the left border could not be accurately delimited on account of the presence of the pleural effusion, but there was no increase in dulness upward, nor to the right, and Rotch's[12] sign—the appearance of dulness at the sternal end of the fifth right interspace, from obliteration of the resonant cardiohepatic angle—was not present.* It was therefore considered probable that the man had adherent pericardium. The insidious nature of the entire process, and the bloody character of the fluid in the pleural sac led me to suspect that the pericardial disease and the pleural effusion were tuberculous in origin. At my request, Dr. Boston, the bacteriologist of the hospital, was kind enough to inject a guinea-pig with some of the pleural fluid obtained July 11, 1900.

FIG. 3.



The patient had to be tapped a second time in September, 1900. He failed gradually, ascites developed, the left pleural cavity again filled up, and the tissues in general (including those of the lower limbs, face, scrotum, and penis) became intensely œdematous. Cyanosis was very marked, and became extreme when the patient made any undue exertion (such as sitting up suddenly or attempting to get up out of bed). He also had peculiar syncopal attacks, in one of which I had the opportunity of observing him. His face suddenly became livid, the pupils dilated widely, and there was a momentary loss of consciousness with twitching of the arms. He automatically raised himself half-way to a sitting posture, the eyes staring. A moment afterward he recovered consciousness and sank back exhausted and sweating profusely. The pupils then contracted, and the face assumed its natural aspect. The whole seizure lasted about half a minute.

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* No note was made of Ewart's[13] sign. This, also known as the first-rib sign, consists in an alteration in the relation between the first rib and the clavicle, so that the upper edge of the former can be felt as far as its sternal attachment. It is due to a raising of the clavicle at its outer and inner extremities, and is made possible by a relaxation of the ligaments between the clavicle and the first rib.

The patient had also a severe, dry, rather muffled cough. As a rule the pupils were dilated, and from time to time presented inequality. Light reaction was present, but sluggish. The bowels were regular. The appetite was variable, and there was some epigastric distress after eating. The tongue was usually clean and moist. There were no chills or sweats.

In September the abdomen was tapped for the relief of the ascites, and fifty ounces of a clear, straw-colored fluid were removed. Improvement followed, but it was transitory. On October 11th the patient fell over in the bath-room. He was quickly carried to his bed, but died ten minutes later.

The autopsy was made on the following day. The body was that of a well-developed white male. Post-mortem rigidity was fairly well marked. The face showed some cyanosis; the lips were blue. The abdomen was distended, and the lower limbs were œdematous. On opening the abdominal cavity a large quantity of fluid (1800 c.c.), straw-colored, and having a specific gravity of 1017, was found. A number of old adhesions were present between the visceral and parietal peritoneum. The appendix was coiled upon itself, and the lumen was apparently obliterated. The liver projected 6 cm. below the costal margin in the midclavicular line. The left pleural cavity contained 1850 c.c. of a clear, straw-colored fluid, having a specific gravity of 1015. The lung was collapsed and adherent to the parietal pericardium by a few fibrous strands. The right pleural cavity was obliterated by old adhesions. The spleen was firmly adherent to the diaphragm; it measured 14 x 10 x 4 cm., and weighed 230 grammes. Section showed it to be congested.

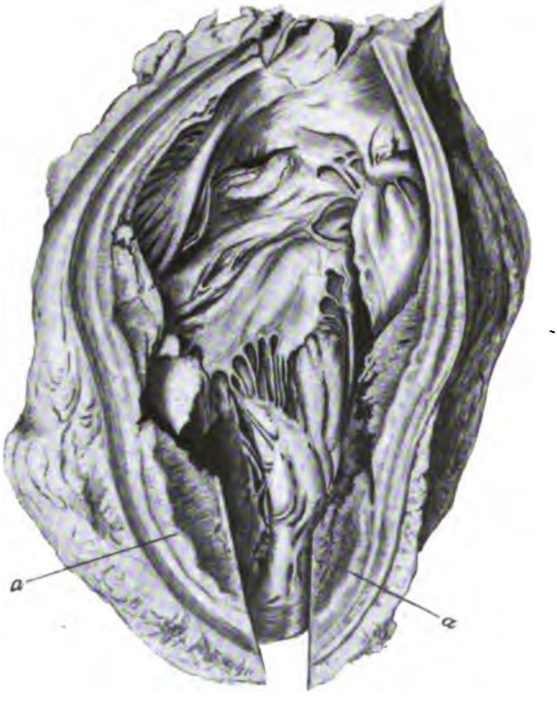
The pericardial sac was obliterated, and it was impossible to separate the visceral and parietal layers. The two layers, with the intervening tissue, had attained an enormous thickness, in places as great as 1½ cm.; a large and extremely strong fibrous band, standing out in bold relief from the general pericardial surface, passed from the heart to the diaphragm. There were also some adhesions between the pericardium and the right and left pleura. At their origin the great vessels were embedded in a thick covering, composed of the infiltrated, coherent, pericardial layers. This coating was nearly a centimetre in thickness, and obliterated the natural recesses between the vessels.

On section it was possible to distinguish three layers in the thickened pericardium—a reddish central layer, and an outer and inner layer, which were paler than the central one and somewhat translucent. Macroscopically there was no evidence of tuberculosis in the pericardium, nor in the pleura or the lungs, except for an old fibroid tubercle, very small in size, in the right apex. One of the bronchial glands was a little enlarged and anthracotic, and on section showed two small, whitish, non-caseous areas.

The heart valves, so far as could be determined without cutting the heart entirely open, were not diseased. The tricuspid orifice easily admitted four fingers. There was decided hypertrophy of the ventricles, particularly of the right. The left lung was collapsed, and absolutely non-crepitant. The heart and left lung together weighed 840 grammes. The right lung was œdematous, congested, and adherent to the chest wall. It weighed 580 grammes, and contained, as stated above, a fibroid tubercle at the apex.

The liver measured 25 x 16 x 6½ cm., weighed 1450 grammes, and was firmly adherent to the diaphragm. On account of these adhesions its surface was rough; on section the organ was congested, and was the seat of slight fatty infiltration. The gall-bladder was distended with bile; the ducts were patulous.

FIG. 4.



Primary tuberculosis of the pericardium; obliteration of pericardial sac; great thickening of pericardial layers. *a a*. Right ventricle cut open.

The left kidney measured 10½ x 5 x 3 cm., and weighed 140 grammes. The capsule stripped with difficulty and left a rough surface. The organ was firm and congested. The right kidney measured 11 x 5 x 3½ cm., and weighed 160 grammes. In general appearance it resembled the left. The suprarenal glands were normal. The pancreas and intestine presented nothing abnormal, except a little congestion. There were a few peritoneal adhesions.

Pathological Diagnosis. Chronic adhesive pericarditis, hypertrophy of the heart, chronic pleurisy of the right side, passive effusion in the left pleural and peritoneal cavities, atelectasis of the left lung, localized chronic peritonitis.

Microscopical Examination. Pieces from the heart, after they had been for some time in alcohol, were further hardened in alcohol and embedded in celloidin. Sections were stained with hæmatoxylin and eosin, with Weigert's stain for elastica, and with carbol-fuchsin for tubercle bacilli.

In a section from the right auricle stained with hæmatoxylin and eosin are shown the heart muscle and the two adherent layers of pericardium. Both layers are the seat of an intense inflammation with round-cell infiltration, which is most marked near what corresponds to the surfaces of the pericardial membranes. There is also a decided cell infiltration at the junction of the visceral layer with the myocardium. This is not equally well marked along the entire line of junction, areas of intense inflammation alternating with others where the process is mild. At the base of the epicardium the cells are principally of the small lymphoid type, with deeply staining nuclei; but as the surface is approached large, pale, fusiform or oval cells make their appearance. These vary in size, and their protoplasm can scarcely be distinguished. They are especially numerous along the trabeculæ of the epicardial fat. Mingled with them are a few large round cells with an abundant pale protoplasm and a deeply staining nucleus. The nucleus resembles that of the small lymphoid cell, but the protoplasm is much more abundant than in the latter. As the surface of the epicardium is approached the pale epithelioid cells become more plentiful and more closely packed. As a result of pressure they—*i. e.*, their nuclei—are distorted. They are elongated, and many are rod-shaped. In places the cells have a certain trend, running in long straight or curved lines, sometimes quite parallel. Where this is the case they seem to follow the planes of newly-formed capillaries. At the points of densest cell accumulation giant cells are seen. They are unusually large and numerous, and are surrounded chiefly by epithelioid cells, many of them with irregular, elongated, twisted or sinuous nuclei. Only a few lymphoid cells are seen in the neighborhood of the giant cells. The outlines of the original tubercles cannot be traced, and the entire pericardial layer near the surface is the seat of a more or less continuous accumulation of round, epithelioid, and giant cells, constituting the so-called tuberculous infiltration.

Newly-formed capillaries are fairly abundant in the visceral layer, especially near the surface. They can be traced up to the limits of the tuberculous tissue, but not into it. On the extreme surface, beyond the cellular area, is a thick, homogeneous layer, practically free from cells, and staining yellowish-red with eosin. Here and there some dust-like particles of chromatin are seen. The layer appears as if composed of a dense, compact fibrin. In places it is separated from the cells of the epicardium by areas of caseous necrosis; in others, it borders directly upon the zone of round and epithelioid cells. In clefts of this fibrin a few small and large round cells may be seen; in other clefts there are peculiar round, pinkish bodies, entirely homogeneous, without nuclei, varying greatly in size, and appearing to be masses of hyaline material.

The parietal layer presents the same appearances as the visceral. Aside from a slight increase of nuclei there is but little change in the myocardium.

In the right ventricle the picture is, in a general way, the same as in the right auricle, but the inflammation is more intense in the epicardium, and is particularly well marked at its junction with the muscle. There is a great deal of caseous necrosis, and giant cells are numerous and large, especially in the necrotic area. Very little evidence remains of a former fibrinous deposit. There is some newly-formed, loose-textured, fibrous tissue, with long, narrow nuclei, the latter running in various directions, but chiefly parallel with the pericardial surface. Toward the myocardium the fibrous tissue is bounded by an accumulation of round, epithelioid, and giant cells, and caseous material. On the other side it merges into the tuberculous tissue of the parietal layer. The myocardium shows an increase of nuclei in the muscle fibres. The nuclei are also in places somewhat larger than normal. Toward the surface there is slight invasion of the myocardium by round cells, which seem to follow the capillaries. There is, however, no sign of any tuberculous process in the heart muscle.

The left ventricle presents nothing materially different from the right. In one of the sections a number of nerve bundles have been included. They are situated in the pericardium, just above the heart muscle. There is nothing abnormal discoverable in them. In their neighborhood is a small, sharply circumscribed cell collection, composed entirely of lymphoid cells. It has the appearance of a minute lymph gland.

Sections were stained for tubercle bacilli, but, probably owing to imperfect preservation, no bacilli could be demonstrated.

In sections stained for elastic tissue by Weigert's method the portion the seat of tuberculosis is found to be entirely devoid of elastic fibres. The wall of the right auricle is very rich in elastica. The fibrils run parallel with and transverse to the muscle fibres. The wall of the right ventricle does not contain nearly so much elastic tissue as that of the right auricle, and the fibres are more distinctly connected with the bloodvessels than is the case in the auricle. The fibres approach the diseased zone very closely, but only a few can be traced into the cell accumulation, in one place running up to but not into a giant cell. The parietal pericardium in both auricle and ventricle contains very few elastic fibres, apart from those in the walls of the bloodvessels. In a section of aorta stained for elastica the tuberculous tissue between the layers of the reflected pericardium is also free from elastic fibres.

The guinea-pig which was injected with some of the pleural fluid weighed about 630 grammes at the time of the injection. It lost weight soon afterward, but only to regain it, and to become heavier than it had been in the beginning. In October it began to fail rather suddenly, and in a short time lost between 250 and 300 grammes. On November 8, 1900, practically four months after the inoculation, it died. At that time the patient had been dead about a month.

At the autopsy on the animal, which was made before the nature of the process in the patient had been cleared up by the microscope, a cheesy focus, containing tubercle bacilli on staining, was found in the lung. The liver was studded with small, whitish nodules, from the size of a pin-head to that of a wheat-grain. They could not be peeled out, and staining with carbol-fuchsin did not reveal the presence of tubercle bacilli in them. The nodules were different from those of ordinary tuberculosis in the guinea-pig, and I was at first inclined to look upon them as an example of psorospermosis. The microscope, however, shows that they are caseous areas, and I have no doubt that the nodules are tuberculous. In the spleen typical tuberculous lesions were found.

A point of interest is the discovery of tubercle bacilli in the pleural fluid by animal inoculation. This fluid had all the characteristics of a hemorrhagic exudate. As there was no tuberculosis of the pleura demonstrable at autopsy it is most likely that the bacilli had entered the pleural fluid either directly from the pericardium or by way of the blood-stream in the acute stages of the pericarditis. At the second tapping, about two months after the first, the fluid was no longer markedly hemorrhagic, and at autopsy it was distinctly serous.

To all appearances the case of adherent pericardium here reported is one of primary tuberculosis of this membrane. So far as I could determine there was no other site of tuberculosis except in the right lung, and here a small healed tubercle was found, such as is common in the vast majority of bodies that come to autopsy in a large municipal hospital. That this focus was the source of pericardial infection must be regarded as possible. It is well known that the bacteria remain alive for a long time even in old tubercles. I would also not deny that a small tuberculous mediastinal gland might have existed at one time, and might have ruptured into the pericardial sac. There was, however, no evidence of such a source at autopsy. Admitting that either of these possibilities obtained, the pericarditis was, nevertheless, the dominant disease in the patient, in comparison with which everything else sank into insignificance. Hence, it is proper, I take it, to speak of the disease as primary, and it is in this, which we might call the clinical sense, that Osler,[14] Coats,[15] and others also use the term. But it is not impossible that independently of the distant pulmonary focus there may have been a primary implantation of bacilli on the pericardium, without the previous production of tuberculous disease elsewhere. This, of course, would be a true primary tuberculosis—that is, primary in the anatomical sense. Such a condition is, no doubt, exceedingly rare, but there is no inherent reason why it could not occur. Nearly all writers recognize, for example, a primary tuberculosis of the pleura. Why should there not be one of the pericardium? The bacilli in these cases must have a portal of entry, through which they invade the system without leaving any trace at the point of entrance. Such portals may be the tonsils, the gums, the teeth, wounds, and the bronchial and intestinal mucous membranes. The majority of cases of lymphatic and osseous tuberculosis are an illustration of this mode of infection. Baumgarten's theory of latent tuberculosis, which is sometimes invoked to explain such conditions, is not supported by strong evidence.

With the view of determining the frequency and the associations of adherent pericardium, I analyzed the autopsies held at the Philadelphia Hospital during the past three years and nine months. In a total of 778 necropsies there were 60 cases of pericarditis—a percentage of 7.7. This is a much lower proportion than those found by Duchek[16] (15.1 per cent.), Willigk[17] (14.1 per cent.), Chambers[18] (16.2 per cent.), and Taylor[19] (12 5 per cent.); but it is probable that in their statistics milk-spots were counted as pericarditis. Among these 60 cases the pericardial sac was obliterated in 20, or in 33⅓ per cent. Leudet[20] found pericardial adhesions in 58 out of 1003 autopsies, the adhesions being general in 25. This is a percentage of 43. Breitung[21] found complete adhesion in 23 out of 324 cases of pericarditis, or in 7.1 per cent.

In none of the twenty cases at the Philadelphia Hospital was any mention made of the existence of tubercle in the pericardium, but as a large number occurred in cases in which there was well-marked tuberculosis of the lungs we may infer that in many at least the pericarditis was tuberculous. This shows what I have emphasized before—that a careful examination of the pericardium, aided by the microscope, is at times necessary to determine the nature of a pericarditis. Of the twenty cases of adherent pericardium five occurred in connection with a more or less active pulmonary tuberculosis. In a number of the others healed tubercles were found in the lungs. In Harris'[22] table, comprising twenty-five cases of mediastino-pericarditis, I find nine to have been associated with tuberculosis.

The influence of pericardial symphysis upon the size of the heart was a point of active contention during the fertile period in which Corvisart, Laënnec, Stokes, Hope, and others were revelling in the discoveries of the stethoscope. Hope was of the opinion that adherent pericardium always led to compensatory hypertrophy. At present it is generally believed that the obliteration of the pericardial sac need not bring about hypertrophy, although it often does. I think that in dealing with this question we must take into consideration the possible coexistence of valvular disease, which in itself would tend to cause hypertrophy. Of seventeen of the Philadelphia Hospital cases in which the weight of the heart was given there was hypertrophy in seven. In all the pericardium was weighed with the heart, but to allow for this I ruled out as not hypertrophied all cases in which the heart and pericardium together weighed less than 450 grammes. In one of the seven the valves were diseased; in four others there was a generalized atheroma or chronic interstitial nephritis. This leaves two, including the one here reported, in which the hypertrophy could be attributed to the pericardial adhesions. In one case in which no weights are given the heart is spoken of as hypertrophied. Intense atheroma and chronic interstitial nephritis were present, in addition to the pericardial symphysis.

Broadbent[23] has advanced the opinion, which was to some extent also held by Bauer,[24] that the size of the heart is determined by the condition of the organ at the time of the formation of the adhesions. If the heart is dilated at that time it is likely to remain so, and may then undergo hypertrophy. Another point to be considered as influencing the occurrence of hypertrophy is the amount of myocardial involvement produced by the pericarditis in its acute stages. If the heart muscle becomes seriously implicated, as is often the case, hypertrophy will not be likely to occur. It follows, therefore, that the presence or absence of hypertrophy is dependent upon the myocardium much more than upon the pericardium.

Tuberculous pericarditis may occur at any time of life—in children and in adults, but the primary form seems to be most common in men. Its symptoms are usually those of adherent pericardium, although they may be those of effusive pericarditis. It is the former that is most difficult of diagnosis, and it is the one with which I wish more especially to deal.

The first aim is to make a diagnosis of adherent pericardium. That the condition is tuberculous is more a matter of subsequent reasoning and inference than of actual demonstration by physical signs. In my own case the manifestations were cardiac failure, as shown by dropsy, cyanosis, and intense dyspnœa on exertion; the presence of a friction sound early in the disease; the absence of the signs of effusion and of endocardial murmurs; the imperceptibility of the apex-beat; and the persistently feeble pulse. All these pointed strongly to adherent pericardium, but they are not the only symptoms of the affection. Hayem and Tissier[25] have called attention to the absence of impulse, without any augmentation in the area of præcordial dulness, as an important sign. Morgagni was apparently familiar with this, and noted absence of the impulse in thirty out of forty-five cases. Systolic retraction of the interspaces in the apex region, or of the entire præcordia, is often present, but, being met with under other circumstances, it cannot be considered as either an important or a valuable sign of pericardial symphysis. In certain cases in which there is a marked mediastinitis, with adhesion of the heart to the chest wall in front, the so-called Broadbent's sign[26] may be developed—that is, a marked retraction of some of the ribs on the lateral or posterior aspect of the thorax. As already mentioned, it was not present in my case, probably because there was no adhesion between the heart and the chest wall. The sign is most readily detected when the patient is sitting in a good light, and the movements of the chest are carefully observed from a short distance off—first from the front, and then from the lateral aspect. In rare cases there is a definite systolic shock or concussion, which is felt by the hand as a back-stroke. It follows immediately upon the systolic succussion, and is in proportion to the force of the latter. It may be perceptible only at the apex, or over one or more interspaces; sometimes it is discernible over the entire præcordia, even around the left side to the back. It is attributable to the elastic recoil or rebound of the chest wall at the beginning of diastole, as soon as the systolic dragging force has ceased. Its presence is naturally only to be expected when the pericardium is firmly adherent to the anterior wall of the chest and the heart is acting powerfully. Another symptom is a complete arrest of the respiratory movements in the epigastric triangle. This was never absent in Broadbent's cases of adherent pericardium, but is, nevertheless, not pathognomonic, as it may occur in other conditions. Adhesion of the heart to the chest wall also prevents the postural change of the apex-beat if the latter is present. When, as is often the case, the lungs are adherent to the outer surface of the pericardium, no change occurs in the area of cardiac dulness when determined in inspiration and expiration (Williams[27]).

The pulsus paradoxus, first described by Kussmaul,[28] is not a characteristic sign of adherent pericardium, and was not present in my case. It consists in a marked diminution in the volume of the pulse during inspiration. When present in pericarditis it is probably due to a compression of the aorta by traction of adhesions during the inspiratory expansion of the chest. Another vascular phenomenon of comparatively little value as a diagnostic sign is diastolic collapse of the veins of the neck—the so-called Friedreich's[29] sign. In one case Broadbent[30] was led to a diagnosis of adherent pericardium by the discovery of the systolic emptying of a vein on the front of the chest to the right of the sternum. The explanation suggested is that the pericardium was adherent to the chest wall and heart, and dragged apart the walls of the internal mammary vein during systole, causing a suction action, so that the blood was drawn into its lumen from the afferent veins during systole. A similar case was met with by Roberts.[31] Letulle[32] considers epistaxis an important symptom of adherent pericardium, an opinion shared by Hayem and Tissier, and by Franck.[33] The latter thinks—somewhat strangely, it seems to me—that left-sided epistaxis is especially important.

There is another symptom that deserves mention, and that is the early appearance of ascites, before the onset of œdema of the lower extremities. This particular phenomenon has attracted a good deal of attention since Pick endeavored to establish as a distinct clinical entity a condition characterized by ascites without cirrhosis of the liver, but associated with adherent pericardium (Pick's[34] pericarditic pseudocirrhosis of the liver). The complex had been previously recognized by Strümpell,[35] Curschmann, and others. It is unnecessary to enter into a consideration of the subject here, but there are sufficient observations now extant to suggest that in cases of ascites of obscure origin it is always wise to suspect the existence of adherent pericardium. With such a suspicion in mind confirmation can be more intelligently looked for.

The disposition of our patient possesses considerable interest. It was, as already stated, unusually morose and even suspicious, and I thought it not unlikely that it might be connected with the pericarditis. Mental disturbances are apparently very common in pericardial disease—much more common, indeed, than in disease of the endocardium.*

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* Psychic disorders are not infrequent in aortic regurgitation, but accurate statistics are lacking with regard to the incidence of such disturbances in the different affections of the heart.

There is no single type of psychic disturbance that can be called characteristic. In one case that came under my observation there was wild delirium. Da Costa[36] has noted the occurrence of melancholia as well as delirium in the disease, and in a clinical lecture urged that in every case of mania and delirium the heart should be examined for signs of pericarditis. Fever is usually present; it is irregular and not characteristic; according to Vierordt it may be absent.

The symptoms enumerated above are capable only of pointing to the existence of adherent pericardium, and do not distinguish between the tuberculous and the non-tuberculous forms of that affection. It is a curious fact that in nearly all the patients in which such a tuberculosis as I have described was found the phthisical habitus was entirely absent —a point to which Vierordt has called particular attention. As a rule, also, the family history is negative as regards tuberculosis.

The diagnosis of tuberculosis, that of adherent pericardium having been made, would, therefore, depend upon the exclusion of the ordinary causes of adherent pericardium, such as rheumatism and other acute infections. The presence of a hemorrhagic infusion in the pleural cavity would be of signal value in diagnosis. In rare instances it may be possible to establish the true nature of process by animal inoculation. As an aid in the differential diagnosis I append a table, which is in part based upon that of Weill:[37]

Rheumatic Pericardial Symphysis.	*Tuberculous Pericardial Symphysis.*
Heart always enlarged.	Size of heart usually normal.
Dyspnœa more or less constant.	Dyspnœa slight, brought on by exertion.
Palpitation common.	Palpitation rare.
Impulse strong.	Impulse feeble, and not easily detected.
Heart sounds irregular and strong.	Heart sounds irregular and feeble.
Endocardial murmurs common.	Endocardial murmurs absent.
History of rheumatism.	Occasional presence of pulmonary tuberculosis, or enlargement of the mediastinal or bronchial glands.
Other serous membranes usually healthy.	Other serous membranes may be affected.
Fluid present in serous cavities is serous.	Fluid present in serous cavities may be hemorrhagic.

DURATION OF THE DISEASE. The duration of the disease is given by Vierordt[38] and Weinberg[39] as from four to eight months. In my own case it could be determined with accuracy, and was just five months.

TREATMENT. The medical treatment of tuberculosis of the pericardium is at present entirely palliative and expectant. Experience at the autopsy table shows that the tuberculous process itself may become arrested, death resulting more from embarrassment of the heart by adhesions or from degenerative changes in the myocardium than from the tuberculosis *per se*. The boldness with which surgeons now attack the serous cavities and the viscera, including even the heart, justifies the hope that at no distant day in the future they will find a way to break up pericardial adhesions before these have become firmly organized.

The salient conclusions to be drawn from our study may be stated as follows:

1. Tuberculosis of the pericardium is comparatively common.
2. It may be primary in the clinical, rarely in the pathological sense, or it may be secondary.
3. The primary form is either a hæmatogenic infection or is the result of extension by contiguity from some trivial focus.
4. The most frequent source of infection is a tuberculous mediastinal or bronchial lymph gland.
5. The primary form is usually chronic, and appears as an obliterative pericarditis.
6. In a large percentage of cases there is an associated mediastinitis, with adhesions to pleura, sternum, and ribs.
7. The symptoms are those of adherent pericarditis or mediastino-pericarditis.
8. In every case of obliterative pericarditis of obscure etiology tuberculosis should be suspected, particularly if there are no endocardial murmurs.
9. The diagnosis of tuberculosis of the pericardium can usually be made only by excluding other causes, except in rare instances of successful animal inoculation with fluid obtained by tapping a pleural cavity.
10. Tuberculous pericarditis may not present any characteristic features at autopsy; hence, microscopical examinations should be made in every case of adherent pericardium before tuberculosis is excluded.
11. In rare cases a clinically primary tuberculous pericarditis is acute, the exudate being serofibrinous, hemorrhagic, or purulent.

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THE EXTENSION OF AORTIC ANEURISMS INTO AND BETWEEN THE WALLS OF THE HEART AND DISSECTING ANEURISMS OF THE HEART.[1]

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THE relations to the heart of aneurisms in the beginning of the aorta are often quite interesting and complex. Interparietal and intraparietal extension may occur, and many so-called dissecting aneurisms of the heart take their origin in the beginning of the aorta.

Dissecting vascular aneurism is the result of an incomplete rupture of the arterial wall from within, through which the blood by its hæmodynamic pressure separates more or less extensively the various layers of the wall. The separation is a rather rough one, there being no real dissection. The walls of the heart are not disposed to this change, because the force or pressure that causes the separation originates in the walls of the heart during their contraction when the various layers are pressed together (Vestberg).

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[1] Read by title before the sixteenth annual meeting of the Association of American Physicians, in Washington, April 30 and May 1 and 2, 1901.

Partial cardiac aneurisms are oftener the result of a uniform dilatation of a weakened area than of rupture and dissection. There are, however, quite a number of places where and methods whereby dissecting cardiac aneurisms may be formed by the separation of layers normally more or less adherent to each other. The aneurism need not originate primarily in the cardiac cavity whose walls largely contain it; it may come from other cavities or from the aorta. The sinus of Valsalva may give origin to dissecting aneurisms which extend into the walls of the heart, because, though properly a part of the heart, they are not affected by the physiological limitations for aneurismal formation seen in other parts of the heart (Vestberg). Aneurisms in the beginning of the aorta may extend into the heart, and on the rupture of the original sac secondary cardiac aneurisms of the dissecting variety may develop. Cardiac aneurisms, apparently dissecting, originating in myocardial abscesses, sometimes are not dissecting aneurisms, strictly speaking, because the larger part, yes, even all the dissecting, may have been done by the suppuration; hence, dissecting cardiac aneurism cannot be separated always from aneurism following myocardial abscess. With the foregoing considerations in mind Arthur Vestberg,[1] in his interesting and complete study of dissecting aneurisms of the heart, defines dissecting cardiac aneurism as a pathological cavity communicating with the heart or with the origin of the aorta, due to a separation by the blood of the layers of the walls of the heart.

Vestberg divides dissecting cardiac aneurism into interparietal, septal, parietal, and valvular, the first being by far the most frequent. Of 60 cases (59 from the literature and 1 original) 47 were interparietal or septal, 5 parietal, and 8 valvular. The interparietal is an interesting form, which occurs in the loose tissue under the epicardium around the root of the aorta. Vestberg, who is the first to give an accurate description of this periaortic space, designates it spatium periaorticum cordis. It is bounded externally by the anterior walls of the auricles and by conus arteriosus dexter; internally or centrally by the aorta, the root of the aorta, and the more or less incomplete conus arteriosus sinister. The roof of the space is formed by the epicardium passing from the posterior surface of the aorta to the anterior surface of the auricles and constituting at the same time the floor of sinus transversus pericardii. The space is divided by the coronary arteries into the auriculo-aortic and the conoaortic parts (spatium atrioaorticum and spatium conoaorticum). The points of exit of the right and left coronary arteries are designated by Vestberg as apertura spatii dextra et sinistra. It will be seen at once that the space belongs to the heart and that aneurisms occupying the space must be regarded as cardiac provided they do not possess independent walls from other sources. Ruptures may occur into the periaortic space from conus arteriosus sinister, the sinuses of Valsalva, the lower part of the aorta, and probably from the coronary arteries. Rupture of the aneurism of the left coronary artery, described by Dr. J. A. Capps[1] in my laboratory, might have resulted in a dissecting aneurism of the heart most likely of the parietal type. The thinnest portion of the internal wall is the fibrous part of the conus arteriosus sinister with its prolongations upward between the aortic valves. Vestberg describes a dissecting aneurism of the periaortic space following rupture due to endocarditis of its internal wall between the base of the anterior mitral valve and the aortic valves. Endocarditis, abscess, sclerosis, and other changes in the beginning of the aorta and the aortic sinuses, traumatic ruptures, and the secondary rupture of aortic aneurisms may lead to dissecting aneurisms in this space. The openings are often linear, especially when traumatic, and round when the result of ulceration. At first there may be no distinct wall, but in chronic cases a membrane may form. From the periaortic space the dissection may extend into the interventricular and interauricular septa, the interparietal aneurism becoming septal. Occasionally it becomes parietal. Secondary ruptures into the pericardium, especially at the orifices of the space—the exits of the coronary arteries—as well as into the right heart may take place.

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[1] On dissekerande hjärtaneurismer, Nordiskt Medicinskt Arkiv, 1897, Ny Följd, vii., Nos. 26 and 30.

The following specimens illustrate many of the features in connection with this form of dissecting cardiac aneurism and the relation to the heart of aneurisms in the beginning of the aorta.

Laborer, aged thirty years, syphilitic; death from typhoid fever. Aneurism of anterior aortic sinus with extension into wall of right ventricle; beginning aneurisms of aorta.

Anatomical Diagnosis (Dr. Crowder). Typhoid ulcer and swelling of Peyer's patches; gumma in epididymis; arterio-sclerosis; aneurism of sinus of Valsalva extending into wall of right ventricle; beginning aortic aneurisms with thrombosis; fibrous perisplenitis and pleuritis; pulmonary œdema; chronic nephritis; œdema of ankles; stricture of urethra; acute cystitis; suppurative prostatitis; catarrhal gastritis.

The sinosal aneurism arises in the sinus behind the anterior aortic valve, the orifice of the right coronary being situated near its bottom; it is 3 cm. in depth and extends into the tissues under the epicardium over the anterior surface of the right ventricle under the apex of the right auricle (Fig. 1). The wall is thin, smooth, extensively calcified, sections showing degenerated fibrous tissue without elastic elements. About 9 cm. above the aortic valves is a brown, circular area, 1 cm. in diameter, which is much thinner than the surrounding tissue and thrown into folds (Figs. 2 and 3), but on outward pressure with the finger a small sacculation is formed. A little higher up is a smaller area of similar appearance and occupied by a thrombus.

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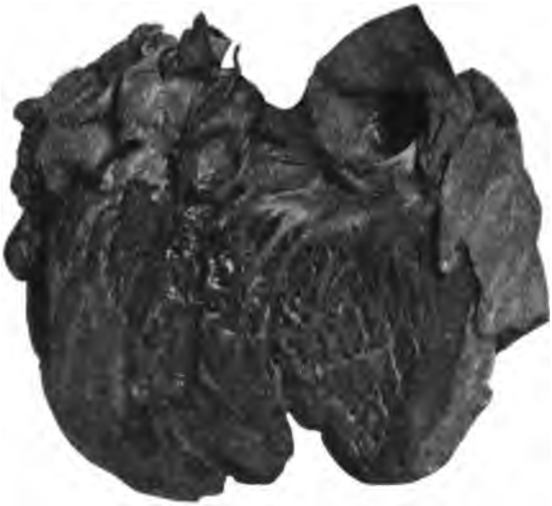
[1] The American Journal of the Medical Sciences, September, 1899.

Sections across the depression and including some of the aorta on each side and also the corresponding part of the pulmonary artery, which here is closely apposed and closely adherent to the aorta, show no changes in the pulmonary artery; its elastic network seems perfect.

FIG. 1.



Aneurism of aortic sinus with extension into wall of right ventricle.

At the point of greatest bulging of the aorta the tissue between the aorta and the pulmonary artery is reduced to a thin layer of hyaline fibres; a few bloodvessels are present and also some greatly flattened and compressed nerves; there are but few nuclei in the hyaline tissue and no cell accumulations. On each side of the aortic bulge there is interposed between the two vessels fibrous tissue with areas of fat, nerve bundles, and bloodvessels. Many of the arterioles show a well-marked fibrous, obliterating endarteritis and hyaline adventitia. In some complete occlusion has taken place.

FIG. 2.

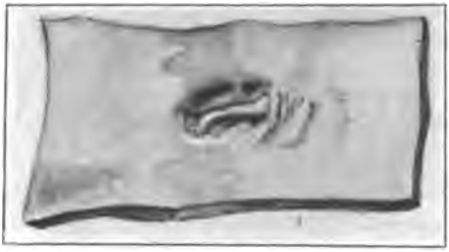


FIG. 3.

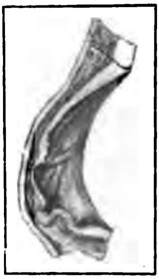


FIG. 2.—Small sacculation in aorta, showing wrinkling of thinned spot.
FIG. 3.—Small sacculation in aorta, showing thinning of media.

Corresponding to the aneurismal bulging the aortic wall is thrown into folds of varying depth; the endothelium is absent; the wall is thinner by about one-half than on each side of the aneurism; there is hardly any normal muscular tissue in this part of the aorta; the wall consisting of a more or less degenerated fibrous tissue with but few nuclei, often distorted and with a tendency to assume a bluish tinge in hæmatoxylin. This fibrous tissue is in reality the greatly thickened intima. There are no foci of cells in this part, but in the media on each side of the bulging are a few thin-walled vessels filled with blood and surrounded by quite marked cellular infiltrations. The cells have deeply stained round or oval rather small nuclei, and the cell bodies cannot be distinguished. There are no elastic fibres immediately around these perivascular accumulations.

The intimal thickening does not give any elastic fibre stain. There are a few irregular, broken-up bundles and masses of elastic fibres between the thickened intima and adventitia at the bottom of the aneurism. In the sections stained for elastic fibres it is seen clearly how the media is gradually replaced by the thickened intima, the media ending in narrow strands of elastic tissue. The elastic fibres in the adventitia are also largely interrupted over the bulging. The arteries with endarteritis obliterans in the tissue between the pulmonary artery and the aorta show a well-developed network of elastic fibres in the new tissue in the intima.

In the smaller aneurism with the thrombotic plug the conditions outlined above are present in exaggerated degree. There is a marked intimal thickening with degeneration. There is a more sudden interruption of the media, which is completely replaced by the intimal thickening as the outward bulging takes place, on each side of which are masses of broken-up elastic tissue. And the vascularization and round-cell infiltration into the media are more pronounced and associated with similar changes in the adventitia. Owing to the cellular infiltration in the media the elastic elements are broken up extensively. Among the cells in the perivascular infiltrations are seen plasma cells, lymphocytes, and endothelial cells. The thrombus is infiltrated with leucocytes; no bacteria present.

Bacteriological Examination. B. typhosus isolated from the spleen; B. coli from the liver and kidney.

Abstract of Histological Description. The liver contains necrotic foci. There is some increase of the connective tissue in the kidneys and the cells of the convoluted tubules are degenerated; there is some endarteritis. There is myocardial disunion. The spleen contains many phagocytic cells; there are also areas of necrosis. The cell accumulation about the base of the ulcer in the ileum contains endothelial cells with cellular inclusions. There is a chronic interstitial epididymitis with obliteration of the vessels as well as foci of leucocytes and epithelioid cells.

One of the cases of aneurism of the coronary arteries described by Capps[1] presents some features of interest in connection with this subject.

Man, telegrapher, aged thirty-nine years, syphilitic and alcoholic, died from bronchopneumonia developing during hemiplegia and convulsions.

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[1] Loc. cit.

Anatomical Diagnosis. Syphilitic leptomeningitis and pachymeningitis; arterio-sclerosis; aneurism of the aorta and of the left coronary artery; chronic aortic endocarditis; fibrous myocarditis; aneurism of interventricular septum; hypertrophy of the heart; chronic nephritis; bronchopneumonia; fibrous pleuritis.

The heart weighs 550 grammes. There is marked thickening of the left ventricular wall. The tricuspid, pulmonary, and ventral valves appear normal. The endocardium is smooth, excepting that the free margin of the aortic valves is rough, thickened, and sclerosed. Just below the junction of the left and anterior semilunar valves is a small bulging in the septum, which admits the tip of the index finger, and is lined with a dense fibrous tissue. Anteriorly the aneurism and the sinus of the posterior pulmonary valve are separated by only a thin partition, which is translucent. The " undefended space " situated to the right of this cavity is unaffected.

Above the left aortic semilunar valve is a bulging of the aortic wall upward and forward into the periaortic tissue. Bordering on this aneurism is the left coronary orifice, which is of normal size. Immediately beyond the opening, however, is a fusiform dilatation of the wall of the coronary artery, large enough to contain a hazel-nut, and extending for the most part posteriorly and to the right. Its walls are streaked with yellowish spots, and in places calcareous scales can be peeled off. Beyond this cavity is a second and smaller dilatation of the wall.

The beginning of the aorta is much thickened, the intima irregularly fissured, and similar changes exist throughout the entire thoracic aorta. The microscopical examination showed principally chronic changes with calcification.

The presence of syphilis in these two cases brings forward the relations of syphilis to aneurism. This is a vexed question. Heller[1] champions the existence of a pure syphilitic aortitis that may cause aneurisms. Peculiar circumscribed depressions, often in groups, especially at the beginning of the aorta, in which the aortic wall is greatly attenuated and wrinkled, with cellular accumulations about the vasa vasorum and destruction and replacement of the elastic and muscular elements of the media, are regarded as the result of a primary syphilitic mesaortitis by Heller and his pupils.[2] In such lesions so-called miliary gummas with giant cells are described by Backhaus and others. Weber has described a gumma as large as a bean in the wall of the pulmonary artery. Backhaus found mesaortitis of this character in seventeen of ninety-nine syphilitics examined at the Kiel Institute. Irregular ulcerations in the aorta with callous margins are also attributed to syphilis. When combined with ordinary arterio-sclerosis the aortic wall may be greatly thickened, uneven, and wrinkled. This is the sclerogummous aortitis of Malmsten, who gives the frequency of syphilitic history in aneurism as 80 per cent. In 82 per cent. of eighty-four cases of general paralysis Straub[3] found the changes described by Heller as syphilitic aortitis.

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[1] Verh. deut. path. Gesellsch., 1900, ii., 346–351.

[2] Döhle, Dissertation, Kiel, 1885.

[3] Verh. deut. path. Gesellsch., 1900, ii., 351–363.

Straub also records the presence of giant cells and gummous productions in the media. In some of these cases were aneurisms with peculiar punched-out orifices. Of seventy-one non-paralytics examined during the same period such changes were found in the aorta but seven times, all in syphilitics, however. Ponfick,[1] Ziegler,[2] and Orth[3] doubt the syphilitic character of all instances of this kind of aortitis because similar changes occur in non-syphilitics. Baumgarten[4] also assumes a clinical attitude. Ziegler and Babes[5] hold that ordinary microbes, as streptococci and staphylococci, may produce lesions similar to those ascribed to syphilis. The changes described in the aorta of Case I. correspond well to Heller's syphilitic aortitis, upon the basis of which it is probable that aneurisms in young syphilitics arise. Perhaps the nearest approach at the present time to the truth in regard to syphilis and certain aortic lesions and aneurisms is embodied in the Scotch verdict, "guilty but not proven."

The beginning aneurisms in the aorta in Case I. show in an interesting manner the histogenesis of aneurism, destruction of elastic elements in the media, thickening with new formation of elastic fibres in the intima, and dilatation. It is rare that one has the good fortune thus to trace the starting of aneurism. Rupture of the aneurism of the aortic sinus might have given rise to parietal dissecting aneurism of the right ventricle. This event is illustrated in a striking manner by the following specimen in the collection of the laboratory, which also shows the gross changes regarded as indicating the syphilitic nature of certain aortic lesions and consecutive aneurisms.

Two sacculated aneurisms of aorta and aneurism of aortic sinus with interparietal and intraparietal extension into heart (Fig. 4). *Dissecting aneurism of periaortic space. Museum specimen; no history.* The heart as a whole is somewhat enlarged, especially the left ventricle. The right heart with its valves is normal. The muscle is of a healthy color. The aortic semilunars are thin and transparent. The beginning of the aorta is dilated somewhat, the intima thick, irregularly nodular and furrowed, and extensively sclerotic. Upon the right and posterior aspects are the openings of three aneurisms. The smallest opening is situated just above the junction of the right posterior and anterior valves; the aneurismal cavity is situated in the periaortic space between the aorta and the right ventricle and auricle; it measures 4 cm. transversely and 7 cm. vertically; the bottom of the cavity rests upon the interventricular septum; at the top the thin roof of the periaortic space is raised quite high. The opening from the aorta into the aneurism is situated about at the centre of its posterior wall. The cavity is empty. There is no trace of the wall of the aorta recognizable in the walls of the aneurism, sections of which show a layer of quite structureless material in the lining, outside of which are a loosely arranged fibrous and fatty tissue with irregular fragments of elastic fibres.

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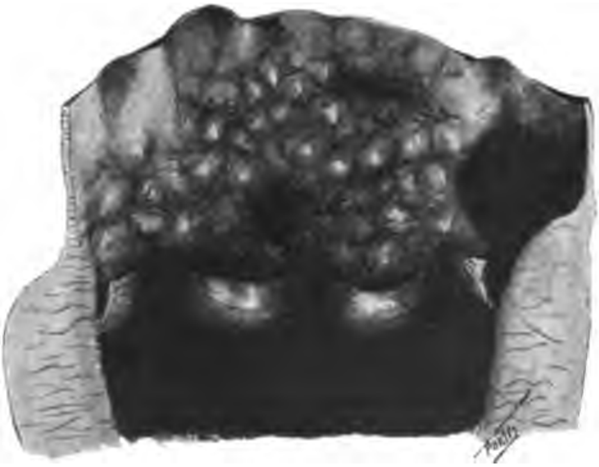
[1] Verh. deut. path. Gesellsch., 1900, ii., 351-363.

[2] Ibid. [3] Ibid. [4] Ibid. [5] Ibid.

The orifice of the second aneurism is a long transverse slit on the posterior surface of the aorta, a little above and to the left of the former. This leads into an irregular cavity composed of two arms—a short one that passes toward the right, and a long one, which passes to the left and downward for at least 4 cm. into the space between the left auricle and the aorta and under the pulmonary artery. The two aneurisms are separated from each other by the descending vena cava, which is closely bound to the aorta at this point. A section of the wall, which is quite thin and covered with thrombi, shows a fibrous structure with a few irregular elastic fibres.

The third aneurism starts in the sinus behind the left posterior valve. The cavity is somewhat irregular and extends into the wall of the left ventricle and along the interventricular groove for 3 cm. At the apex the wall is translucent. The left coronary artery opens at the margin of the aneurism: its descending branch is normal, but the main stem is obliterated for about 2 cm. as it courses over the aneurism. The aortic wall is recognizable throughout in this aneurism.

FIG. 4.

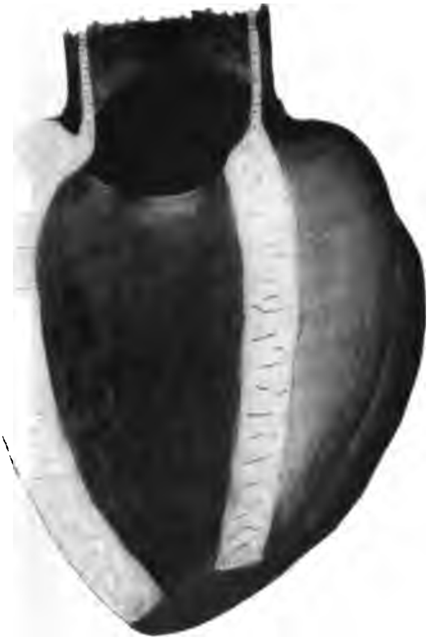


Three sacculated aneurisms of the aorta and aneurism of aortic sinus, with interparietal and intraparietal extension into the heart.

This interesting specimen illustrates at one and the same time interparietal and intraparietal extension of aortic aneurisms into the heart and the secondary formation of dissecting aneurisms in the periaortic space.

Large parietal aneurism of the right ventricle originating in sinuses of anterior and right posterior aortic valves (Figs. 5 and 6). *Museum specimen; no history.* The heart is much enlarged, the pericardial cavity wholly obliterated, the aorta extensively sclerotic and calcified. The aneurism originates immediately behind the anterior and left posterior valves by an opening 4 cm. in diameter. Viewed from within the aneurism the aortic orifice appears triangular. The aneurism seems to have dissected its way in the wall of the right ventricle, extending from the aorta between the right auricle and the pulmonary artery to the apex of the ventricle covering the anterior and lateral aspects of the latter. The right auricular appendix is embedded in the wall of the aneurism. At the apex muscular tissue and subepicardial fat are readily recognized upon the external surface of the aneurism, and outside of these is a well-marked layer of fibrous tissue—the adherent pericardium. The lining of the aneurism is almost universally calcified, fissured, roughened, and cracked. On account of the calcification the aneurismal walls do not collapse, but remain stiff, being easily separable into more or less structureless layers in which are also calcareous scales; and there are continuous sheets of calcareous material in the pericardial adhesions for some distance beyond the bounds of the aneurism. The cavity is empty. There are no definite traces of aortic wall beyond the opening. Microscopical sections from various parts show a structureless wall consisting largely of calcareous material covered externally, especially at the apex, by a layer of fibrous tissue containing a dense layer of elastic tissue like that in the epicardium.

FIG. 5.

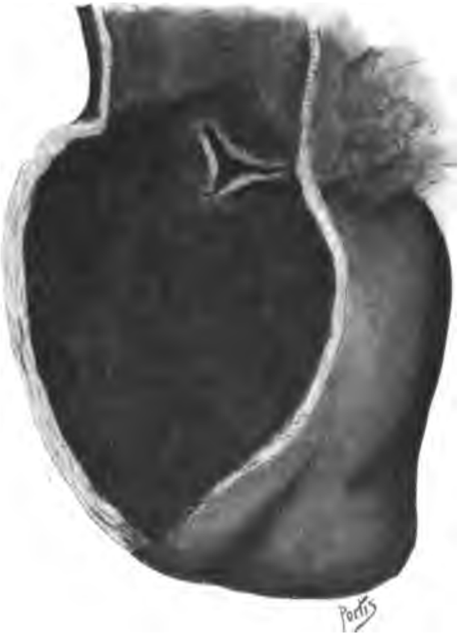


Large parietal aneurism of right ventricle originating in aortic sinuses, anterior view.

The following specimens are examples of endocarditis of aortic valves as related to dissecting cardiac aneurism. In the first the beginning of the condition is shown, while in the second and third destruction of the internal wall of the periaortic space has been followed by a typical dissecting aneurism in its conoaortic part.

Acute endocarditis of the aortic valves, developing in the course of lobar pneumonia in a man, aged thirty-seven years, destroyed a large part of the left posterior valve, causing an extensive perforation of the segment and extending from the ventricular aspect of the valve to the interventricular septum (Fig. 7). In the septum there is an irregularly oval, ulcerated excavation, covered by detritus. The ulceration has extended upward between the myocardium and the aorta and has reached the lower part of spatium periaorticum (Fig. 7). Microscopical sections through the affected area show about the ulcer an extensive inflammatory infiltration, with numerous colonies of bacteria; the inflammatory changes extend far out into the myocardium and are especially marked in the tissue of the periaortic space.

FIG. 6.



Large parietal aneurism of right ventricle originating in sinuses of aortic valves, posterior view.

The pneumococcus was isolated in pure culture from the vegetations and ulcers.

Acute and chronic endocarditis of aortic valves; dissecting aneurism of the periaortic space (Figs. 8 and 9). The left posterior aortic valve is thick and fibrous, the part near the anterior segment is extensively destroyed, tattered, and shreddy. The right posterior valve shows an oval, irregular ulcer on the ventricular surface. The anterior valve is largely destroyed; it is perforated by an opening, 1 cm. in diameter, from the aortic sinus, and the remaining ventricular surface is covered by granular thrombotic depositions. The triangular space between the anterior and left posterior valve presents an opening coextensive with the space and reaching up to the upper limit of the attachment of the valves upon the wall of the aorta. This opening leads into a smooth walled, empty cavity, situated between the aorta and the pulmonary conus, and the beginning of the pulmonary artery. This cavity extends to the right and to the left for a short distance from the margins of the opening in the root of the aorta; the prolongation to the left shows a tendency to extend into the interventricular septum. The lower margin of the aneurismal opening, which rests upon the top of the interventricular septum, is quite smooth. The undefended space is not involved in the lesion. The aneurism does not communicate with any other part of the heart than the left ventricle. No trace of aortic tissue is demonstrable in its walls, which in places show a necrotic surface with leucocytic and cellular infiltration, especially around micrococcal masses, in the deeper layers. Micrococcal masses are also present in the granular and necrotic layers on the surface.

FIG. 7.

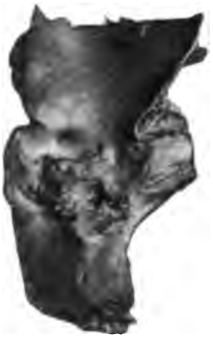


FIG. 8.

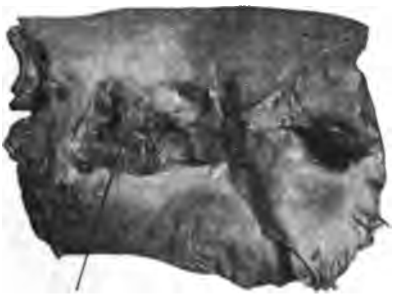


FIG. 9.

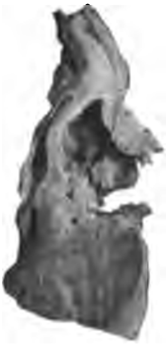


FIG. 7.—Extension of aortic endocarditis to interventricular septum.
FIG. 8.—Acute aortic endocarditis; dissecting aneurism of periaortic space.
FIG. 9.—Aneurism of periaortic space following acute endocarditis.

Acute streptococcus and chronic endocarditis of aortic valves; perforation of internal wall of periaortic space and beginning dissecting aneurism. This occurred in a man, aged thirty-four years, who died from erysipelas and acute streptococcus infection of the aortic and mitral valves during the course of chronic aortic endocarditis. The left posterior and anterior aortic curtains are extensively ulcerated and perforated, and in the triangular space between the two halves is a ragged opening extending into the periaortic space, the walls of which are dissected so as to form a small cavity.

A PERIENDOTHELIOMA OF THE DURA MATER INVOLVING THE CRANIAL NERVES.[1]

By D. R. Brower, M.D., LL.D.,
PROFESSOR OF NERVOUS AND MENTAL DISEASES,

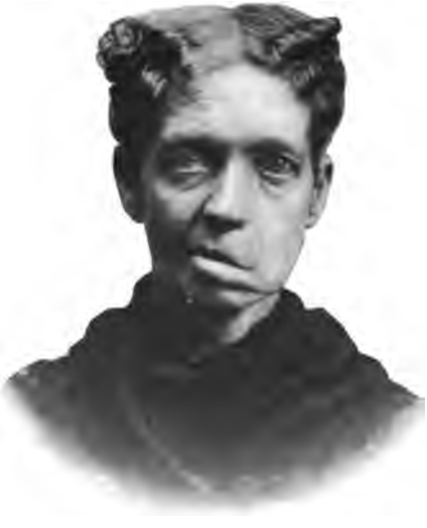
AND

H. G. Wells, Ph.B., M.D.,
FELLOW AND ASSISTANT IN PATHOLOGY, RUSH MEDICAL COLLEGE, CHICAGO.

Report of Dr. Brower.

Mrs. W., aged forty-seven years, was brought to my clinic, October, 1890, by Dr. Annetta S. Dobbins, with the following history: She was admitted to the Woman's and Children's Hospital, May 28, 1882, complaining of a sense of weariness on the slightest exertion, of an intense earache in the left ear, a severe headache, and pain and swelling of the left side of the face. There was a slight trace of albumin in the urine, and a slight aortic regurgitant murmur. She had had three living children and six miscarriages. Under treatment she improved, and was discharged June 29, 1882. On January 6, 1883, she returned to the dispensary of the hospital, on account of a distressing and peculiar cough. The following June she again returned to the hospital with a transitory attack of left hemiparesis, the sensory impairment

Fig. 1.



The patient as she appeared at my clinic, December, 1897.

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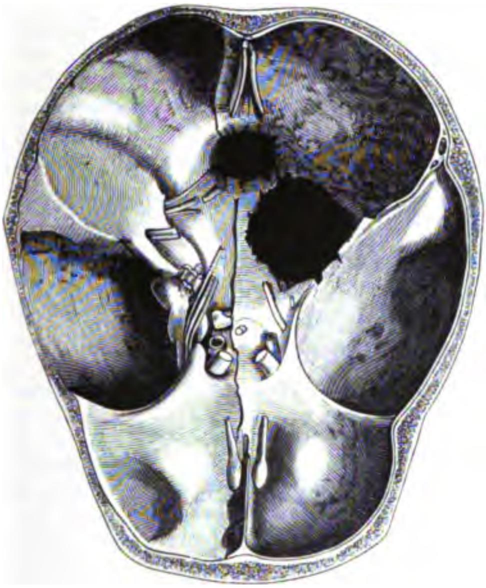
[1] Presented at the meeting of the Chicago Pathological Society, January 14, 1901, with specimens.

being more marked than the motor, and the cough of the preceding winter more harassing. A month later she had another miscarriage, in which there was an unusual loss of blood. She was again taken to the hospital, and there the facial paralysis was detected, and on examination all the cranial nerves below the fourth except the abducens were found to be involved. On my examination I found paralysis of the motor and sensory branches of the trigeminus on the left side; of the abducens manifested by strabismus, diplopia, and dizziness; of the facial, a complete facial paralysis, the muscles showing the reaction of degeneration; the auditory, with a complete loss of hearing; of the glossopharyngeal, shown by a posterior ageusia; of the pneumogastric and spinal accessory, shown by the cough, disturbed respiration and heart's action, alterations in the voice, gastralgia, and difficulty in swallowing; of the hypoglossal, by hemiparalysis and atrophy of the tongue. The only symptom that showed progression of the pathological condition was the involvement of the abducens, as compared with the record made in 1883. The lesion began in May, 1882, probably slowly progressed, and just when its maximum was attained, after July, 1883, the record does not show. There was at the time of my examination also atrophy of the left sternocleidomastoideus and of the upper part of the trapezius muscles. Albumin was still present in the urine, and a slight aortic regurgitant murmur, and the arteries showed marked sclerosis. She had had at this time in all twelve miscarriages. The family history was negative; the mother was still living, and the father had died a few months before of cardiac disease.

FIG. 2.



The lesion diagrammatically as located at this clinic.

We made the diagnosis of meningeal tumor, because the symptoms continued to be unilateral until the end. Nuclear lesions are almost invariably bilateral, or soon become so, and, moreover, there was no progression upward or downward. I excluded an amyotrophic lateral sclerosis and progressive bulbar paralysis.

There were at no time in the case any pressure symptoms manifest. Repeated examinations were made of the optic fundus, and nothing abnormal found. Interesting features of the case are, first, its long period of quiescence; beginning with 1890 till the time of her death the case was shown every year at my clinic, and the symptoms showed no progression. The growth of the tumor, also, must have been slow. The next interesting fact is the absence of pressure symptoms, and the third interesting one, and the very important one, is the fact that the pathological study of the tumor excludes syphilis in its pathogenesis, and makes it a benign tumor of the perithelial variety. We supposed it was syphilitic, because of her numerous miscarriages, none of which were the product of violence, and because of the marked arterial degeneration which she had, and because of glandular enlargements, and because of the benefit derived from the use of antisyphilitic remedies. She was probably a syphilitic patient with a non-syphilitic brain tumor, and this fact should make us more cautious in referring the genesis of nervous symptoms to syphilis in syphilitic patients.

The patient died of angina pectoris.

Pathological Report by Dr. Wells.[1]

Autopsy was performed twenty-six hours after death by Dr. S. M. White and myself. The body was that of a slenderly built, poorly nourished woman. It was noticeable that the mouth was drawn to the right and that the left cheek was thinner through its substance than the right. The chief findings in the body were the following:

1. A marked general arterio-sclerosis, seen especially in the larger branches, such as the splenic and coronaries, which were calcified into unyielding, tortuous tubes.
2. Calcification of the aortic valves, without incompetence to the water test or stenosis.
3. Hypertrophy of the left ventricle.
4. Advanced chronic interstitial nephritis.
5. A neoplasm of the dura, extending into the petrous portion of the left temporal bone.
6. Left hemiatrophy of the facial muscles and of the tongue.

Nowhere in the body could lesions characteristic of syphilis be found, although on account of the history of the case and the provisional diagnosis they were looked for most carefully. The extensive arterio-sclerosis and the calcification of the aortic valves could have been syphilitic, but were not necessarily so.

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[1] From the Laboratory of Pathology, Rush Medical College.

On opening the cranial cavity nothing abnormal was found over the surface covered by the calvarium. The left inferior posterior fossa, however, was found to be occupied by a mass binding the dura firmly to the skull, less so to the brain. The dura, brain, and tumor mass were removed *in toto* by cutting the growth out of the petrous bone. It was found that this bone had been invaded anteriorly as far as the foramen lacerum medium and along the superior border of the petrous portion of the temporal, and posteriorly to the margin of the foramen magnum, although not into it. The mastoid process had disappeared. This location and extent, it will be noticed, exactly agrees with the provisional location determined from the clinical findings as shown in Fig. 2.

On complete removal the tumor was found to consist of a dense tissue, resembling fibrous tissue in most places, although toward the median line were several softer, reddish, nodular masses. The greatest length of the tumor is antero-posteriorly, this diameter measuring 6.5 cm.; transversely it measures 4 cm., and the same in thickness. More of the growth is external than internal to the dura mater, which seems to bisect it. Its superior surface is in contact with the inferior surface of the left cerebellar hemisphere and the posterior portion of the temporo-sphenoidal lobe, but it is not adherent to the brain nor to the pia mater. It is held attached to the brain by the vessels and nerves entering its substance. On the internal surface it is in contact with the pons and the anterior half of the medulla. It is quite plain why the paralysis involved just the nerves it did—the fifth to the twelfth inclusive. The fourth, rising from its deep nucleus in the floor of the aqueduct of Sylvius, and emerging in front of the pons from the outer side of the crus, would escape any direct pressure from the growth. On the other hand, the fifth, emerging from the lateral aspect of the pons, would be pressed upon at this point, and also as far forward as the Gasserian ganglion. Similarly all the other nerves behind the fifth would be destroyed. Unfortunately, during the removal of the brain the nerves behind the third were torn from the brain at their roots, so that the changes in them cannot be studied.

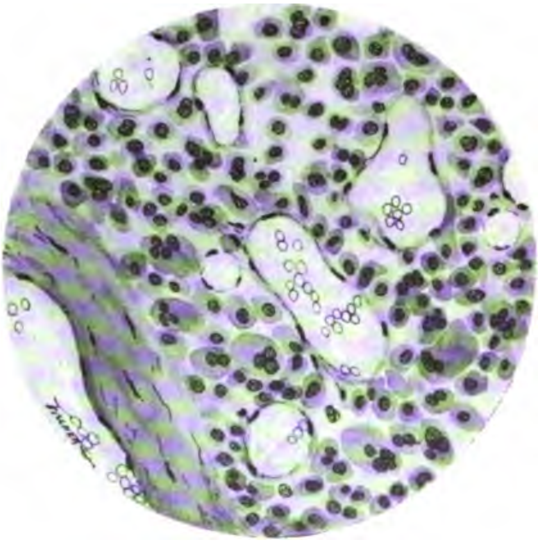
Connecting the growth to the brain are the anterior and inferior cerebellar arteries and small branches from the left vertebral. Anteriorly the internal carotid enters and courses backward and internally in its substance to emerge near the inner anterior angle. Its walls are much thickened (sclerotic), but not invaded by the tumor tissue, in which it lies in a distinct sheath, nor does the lumen seem lessened by pressure.

The left lobe of the cerebellum is atrophied so that only the posterior half remains, and this remnant is pushed to the right so that its middle line corresponds to the right edge of the medulla, the left tonsillar lobe lying over the lower end of the fourth ventricle. The left temporo-sphenoidal lobe is flattened so that it is about two-thirds the size of the right; this is the result of the lessening in size of the convolutions rather than to a disappearance of them. The medulla is pushed slightly to the right, and the left olive seems smaller than its fellow. The left half of the pons is greatly atrophied, being but 7 to 10 mm. in thickness, while the right is 12 to 18 mm. thick. This atrophy involves the entire left side of the pons. A special study of the changes in the central nervous system will be reported subsequently.

On cross-section the tumor is found to be exceedingly vascular, in some portions almost spongy with bloodvessels. The peripheral portions are less vascular than the central and more fleshy, the centre being rather fibrous. In consistency it is firm, but quite elastic. Many minute granules of calcified material are present near the centre, but absent in the periphery, barely visible to the naked eye as clear, sand-like particles. Except where torn in removal from the bone the growth is distinctly surrounded by a thin, fibrous capsule. The dura loses its identity in the tumor, no traces of it being visible on the cut surface.

Microscopically the different portions of the tumor vary slightly in structure, but are made up in varying portions of bloodvessels, which are always numerous, stroma, and tumor cells. For the most part the vessels are the prominent feature, for in some sections they are so numerous as to resemble an angioma. This is especially true of the peripheral portions of the growth. In the centre the vessels are larger, generally surrounded by considerable connective tissue, and but few of the small vessels are to be seen.

FIG. 3.

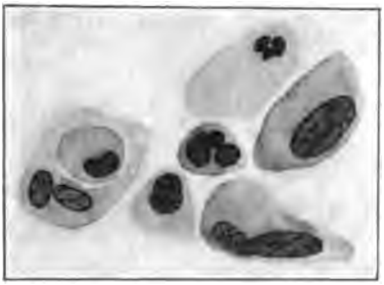


Section of tumor, showing its vascular structure and the relation of the tumor cells and vessels.

The larger vessels have walls consisting of an internal layer of endothelium and a series of laminæ of connective tissue surrounding it, with apparently no muscular tissue. They differ from the smaller vessels solely in size and in the amount of connective tissue in their walls. The very smallest capillaries always possess these two layers, an internal lining of endothelium and a layer of connective tissue, which may, however, consist of but little more than a basement membrane supporting the endothelium. No changes were seen in the endothelium, which is identical with that of adult vessels; nowhere is it found proliferating. In proportion to the thickness of their walls the lumen of the smaller vessels is large, so that they resemble the vessels of granulation tissue (Fig. 3).

In the peripheral and most vascular portions the numerous vessels are entirely surrounded by the tumor cells, which fill all the space between them in such a way that it might be said either that the tumor cells form the stroma for the vessels of an angioma or that the vessels form the stroma for the cells In these parts the bulk of the tissue is about equally vessels and cells. Between the cells there is no stroma. The cells are of several types (Fig. 4). For the most part they have a deeply staining spherical nucleus, often eccentrically placed. The protoplasm is quite abundant, and its shape depends entirely upon the surroundings. Sometimes it is symmetrically disposed, and we find a large round or polygonal cell with a relatively small nucleus duplicating a large mononuclear leucocyte or a flat endothelial cell. Again, the protoplasm may be pressed out so that the cell tapers, shaped like a tadpole, with the nucleus at the head. The margin of the cells is always clear, and usually we find a space separating them. Many of the cells are multinuclear, even those that are quite small sometimes having two nuclei. The large multinuclear cells are of various types. The commonest form is about the size of the ordinary endothelial cell when viewed on the flat surface, and has from four to eight nuclei, which are usually near one end. Occasionally the nuclei are peripherally arranged, resembling a small, tuberculous giant-cell, but this form is exceptional. The shape varies with the surroundings, but is generally polygonal. When the cells are cut across the nuclei are seen to lie in a mass upon each other, and it is demonstrated that these large cells are usually flat and of the general structure of endothelial cells. Cells are also seen that seem to contain small cells within their protoplasm, resembling phagocytic endothelial cells as seen in lymph glands in the acute infectious diseases. Another type of the large cell has what at first sight appears to be a giant nucleus, but which is in reality a mass of nuclei, superimposed and apparently partly coalesced. A few cells, however, have a single enormous nucleus, staining intensely, very granular or ragged in structure. Probably such large cells as have just been described might be called mononuclear and multinuclear giant cells. Karyomitosis was not observed in a single instance.

FIG. 4.



Different types of cells.

As to the arrangement of the component parts of the tumor, the unit seems to be a bloodvessel surrounded by a mass of tumor cells. Whether this vessel is very thinned wall and with a large lumen, as is usually the case, or is covered by a thick mass of fibrous tissue, does not seem to influence the arrangement. Just outside of its connective tissue walls are always to be found the tumor cells, which are in contact with the connective tissue, but not united to or entangled in it, a distinct line of demarcation being present between the two structures as clearly as between an epithelial structure and its basement membrane. Between one vessel and its nearest neighbor lie only the cells, without any fibrous structure whatever. In other words, as before mentioned, the tumor cells may be considered as stroma holding the bloodvessels in position or the bloodvessels may be considered the stroma of the tumor. The only connective tissue demonstrable by Van Gieson's method is that about the walls of the vessels, or processes which occasionally branch from the larger vessels and the capsule, which run but short distances and seem to connect with vessels.

In the gross specimen calcified spicules were found. It is seen microscopically that these are not simple granules of calcium salts deposited in degenerated tisues, but true bone. None of them is large, and all are surrounded by a fibrous capsule. Within the calcified tissue the bone corpuscles with their branching projections into the canaliculi are plainly seen, most numerous just beneath the investing fibrous membrane. No other evidences of degeneration are found.

Just where to place this tumor as to classification is a matter of much interest. Primarily it must be considered a benign growth, as shown by its clinical history and its gross anatomy. It is evidently a vascular tumor, differing from the simple angiomas in possessing an intervascular matrix of cells of endothelial type. Borrmann[1] has classified the tumors of vascular origin in a way that seems especially clear and satisfactory, as follows:

1. ANGIOMA.

Hæmangioma.	Lymphangioma

2. ENDOTHELIOMA.

Hæm(angio)-endothelioma.	Lymph(angio)-endothelioma.
(No capillaries.)	(The common endothelioma of the literature.)
Consists of vessels with a characteristic wall, which are filled with proliferated endothelium. Growth apparently not from new formation of vessels, but only through proliferation of the vessel-endothelium.	Consisting of cell-cylinders and cell-columns which lie in the lymph spaces. Growth by progression of the proliferating endothelium of the tissue spaces and lymph vessels along the course of the latter.

Capillary-endothelioma.

Consists of new-formed (tumor) capillaries, which arise from proliferated capillary-endothelium. The capillaries become filled finally by growing endothelium. Grows by newly formed capillaries which are protruded as fine tubes or cylinders.

3. PERITHELIOMA AND PERIENDOTHELIOMA.

Perithelioma.

Development unknown. Consists chiefly of many vessels with many-layered, superimposed, radially arranged cells, which lie perpendicularly on the outer wall of the vessels.

Peri-endothelioma.

Development unknown. Consists chiefly of many vessels with many-layered, superimposed cells, arranged concentrically about the outer wall of the vessel, with their long axis in the direction of the vessels.

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[1] Borrmann. Virchow's Archiv, 1899, Bd. clvii. p. 297.

In the tumor under discussion it is found that the cellular portion always surrounds vessels, and is always the only structure between any two adjacent vessels. These cells do not seem to be in any way related to the endothelium lining the vessels, being always separated from them by a wall of connective tissue. Evidently they form for the vessels of the tumor a perithelial structure, for they lie outside of every vessel and form the tissue separating the vessels. As a perithelioma we recognize under Borrmann's classification a tumor whose cells are of the spindle-cell sarcoma type, arranged more or less radiating from the vessel they surround. Here, however, the cells are not of the ordinary sarcoma type, but are flat cells which, with the exception of being multinuclear in many instances, resemble typical endothelial cells, even to the extent of sometimes acting as phagocytes for other smaller cells. The only cells in the adventitia from which such a tumor can arise are in the lymphatic sheath surrounding the vessel. Such tumors Borrmann calls periendothelioma, which is perhaps as exact and descriptive a name as any for such a growth. He states that in such tumors the cells are arranged parallel to the vessel wall, in contradistinction to the radial arrangement of the perithelioma or angiosarcoma. In this dural tumor no definite arrangement of the cells is seen; they seem to simply fill the spaces between vessels, and may be found cut in every direction in relation to the section of the vessel they surround.

Endothelioma of the dura mater is generally a benign tumor, less often malignant than when arising in the pleura and peritoneum, and still less so than endothelial tumors of the ovary and testicle.[1] It is especially the case that psammomas or sand-tumors are benign, and this tumor macroscopically might be classed as psammoma, although the number of calcific granules was smaller than usually are found in such growths. The calcareous infiltration in psammoma, however, is never an ossification, but simply a deposit in degenerated connective tissue (Sailer). Virchow[2] has recently defined his original use of the term "psammoma," and states vigorously that it does not include the endothelial tumors.

Giant cells have been occasionally recognized in endothelial tumors. Brosch[3] and Glockner[4] have both studied them. The latter describes both the mononuclear and multinuclear types seen in this case, and found them in four of sixteen endotheliomas of the pleura or peritoneum. He considers their origin to be the same as that of the small cells about them—that is, from the endothelium—and due to rapid division of the nucleus without division of the protoplasm. Others, he

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[1] For a complete and excellent discussion of the subject of endothelial tumors, see article by Sailer in the Contributions from the Pepper Laboratory, Philadelphia, 1900, p. 416.

[2] Virchow's Archiv, 1900, Bd. clx. p. 32.

[3] Ibid., 1896, Bd. cxliv. p. 289.

[4] Ziegler's Beitrage, 1899, Bd. xxvi. p. 73.

thinks, may form from direct segmentation and fragmentation of nuclei. The large uninuclear giant cells are probably the result of abnormal karyokinesis, and possibly also produced by fusion of a number of single nuclei. Sailer considers that in his case the multinuclear giant cells are apparently aggregations of cells, and many features of my own specimens suggest such an origin. In justice it must be said, however, that identical appearances would be produced by a division of the giant cells into smaller cells, and as a possible confirmation of this view is the much greater frequency of giant cells in the newest parts of the growth. Glockner considers it possible that the giant cells may undergo such a splitting up into small cells. One other source for the giant cells in this case must also be considered. The dura serves not only as a serous membrane, but as a periosteum for the skull, and any tumor arising from periosteum is, of course, especially likely to contain giant cells. In this connection may be recalled the ossified granules previously described. However, giant cells have also been found in endotheliomas not connected with bone—*e. g.*, the pleura, peritoneum, pulmonary vein.

In conclusion, this tumor may be stated to represent a benign growth of the dura mater, derived from the endothelium of the lymphatics of the perithelial layers of the bloodvessels, the periendothelioma of Borrmann. As special structural features may be mentioned the presence of many uninuclear and multinuclear giant cells and spicules of true bone.

GONORRHŒAL MYOSITIS.[1]

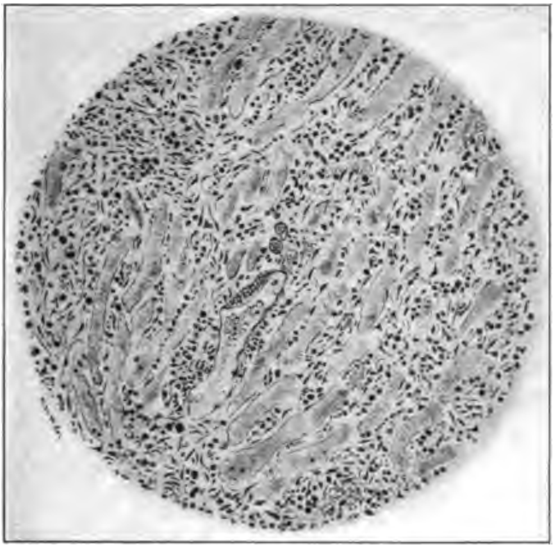
By Martin W. Ware, M.D.,
ATTENDING SURGEON TO GOOD SAMARITAN DISPENSARY, NEW YORK.

The earliest reports of the biological history of the gonococcus accorded it merely the rôle of a local parasite whose habitat in the genito-urinary tract was determined by its predilection for the epithelium here found, though long before the day of the specific gonococcus, clinical experience had taught us of the contemporaneous existence of joint inflammations during the gonorrhœa ; yet not till the finding of the gonococcus in the joint secretions by Kammerer, Hartley, and others was the presumed barrier to its growth in tissues other than epithelial broken down. From that time on we have had overwhelming evidence of its ravages, based on its occurrence, in remote parts of the human organism—the heart, nerves (Leyden), and bones (Ullman), and only to be explained by metastasis ; but of very recent date are the clinical observations pointing to its affection of muscles. Such a case came under my care.

[1] Read before the Genito-urinary Section of the New York Academy of Medicine, April 17, 1901.

A male, aged thirty-five years, otherwise enjoying good health, contracted gonorrhœa two months ago. In the fourth week of its existence he had a chill and fever with pain in the left knee-joint, preventing him from walking, for which he obtained hospital relief. After three weeks of rest he was discharged (no evidence of joint trouble being present). He consulted me for a severe pain about the shoulder-joint. This region showed fulness, no redness, active abduction was impossible, passively it was attended with instant spasm of the abductor group. While ascertaining this an exquisitely tender area was elicited in the group of muscles which make up the posterior axillary fold. By palpation an induration the size of a walnut was felt posteriorly in the muscles, the overlying skin being movable. From the axillary surface nothing could be felt. The daily elevation of temperature was about 100° F. At this stage of the examination the aforementioned history of infection was given, and although the patient subjectively complained of nothing referable to the urethra, yet the glass and Jadassohn tests showed an active posterior urethritis with shreds containing gonococci. Close questioning brought forth an admission of hourly diurnal and three or four nocturnal micturitions. In a few days under expectant treatment (iodine locally) the mass not only grew, but the pain became so intense that I decided to incise in the expectation of giving relief to some pus under tension. Under local anæsthesia I reached the muscles and found them sodden, of a grayish color, and further in depth very friable. No pus was encountered, but a free oozing of turbid serum. Some of the latter material was utilized for bacterial inoculations and cover-glass preparations made. A piece of the muscle was excised.

FIG. 1.

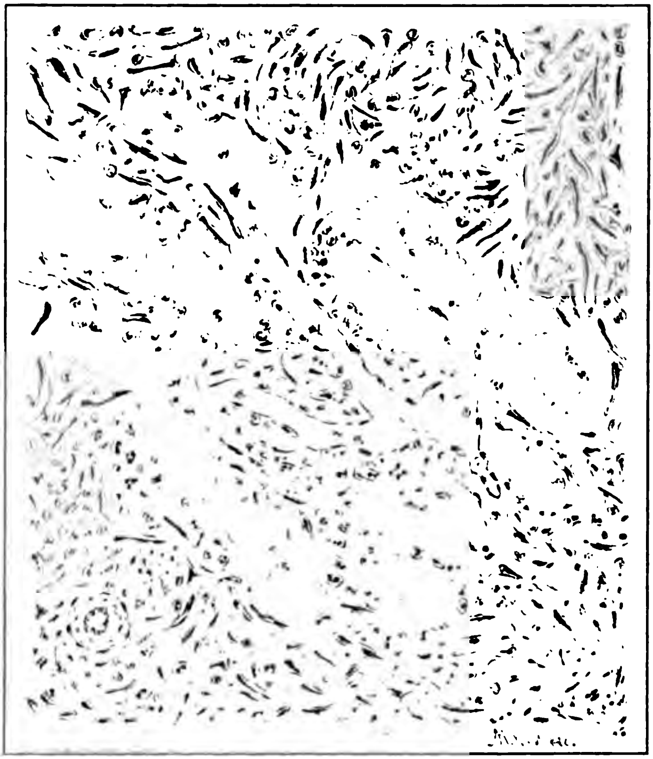


Section of the muscle (3 m.) showing the diffuse extent of the connective tissue proliferation. Ocular 4, objective A A (Zeiss).

The wound was left open to be drained, and as much as six weeks elapsed before its final closure. Though relief from pain followed the incision, subsequently the induration extended, though not in degree involving the whole of the muscle, the latissimus dorsi, to its insertion. When the wound finally closed the area of induration retracted very slowly, and in proportion abduction became more and more possible.

Pathology. The only culture media available at the time were sugar agar and sugar bouillon. Two tubes of each were inoculated and remained sterile in the thermostat at 38° C. The cover-glass smears, of which three were made, showed diplococci (Fig. 4) in but two, and no other micro-organisms. The diplococci found were typical gonococci in arrangement and shape, and furthermore were decolorized according to the Gram stain. They were exceedingly sparse. Their scant number, together with the unsuitable media, may account for the failure of the culture, but, on the other hand, the exclusion of any other pus organism is valuable evidence of a negative kind in favor of the existence of gonococci. The section of the muscle (3 m.) embedded in celloidin shows an exquisite picture of interstitial inflammation (Figs. 1

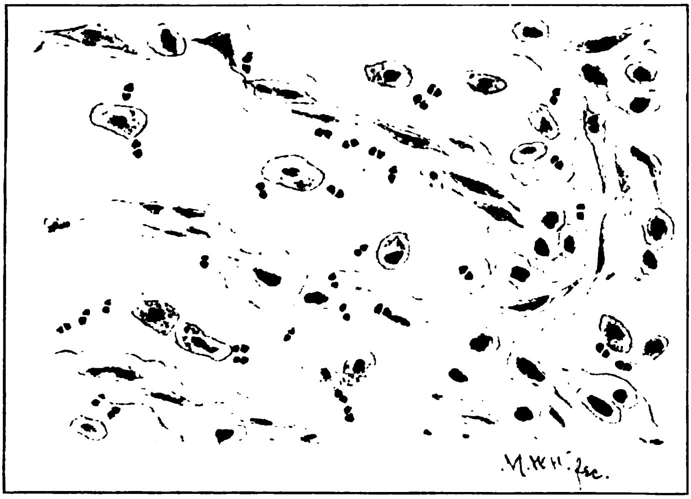
FIG. 2.



Section of the muscle (3 m.) showing the interstitial connective tissue proliferation and cloudy swelling. Ocular 4, objective D D (Zeiss).

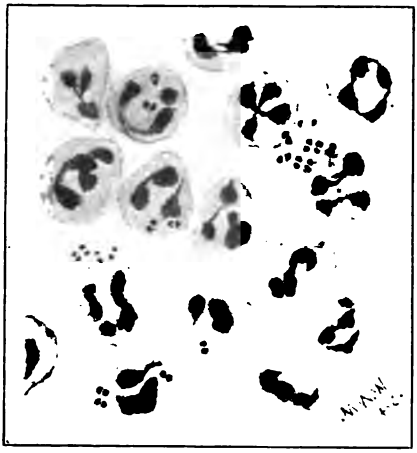
and 2). The muscle fibres in part are the seat of cloudy swelling, yet where they are intact the striations are clearly visible. There is some shrinkage from the perimysium, and the nuclei in places tend to multiply, which may be a sign of regeneration. The connective tissue proliferation is so great as to largely increase the interval between the individual muscle fibres and also to compress them. Sections stained

FIG. 3.



Section of the muscle stained to show the gonococci. Ocular 4, objective ½ (Zeiss).

FIG. 4.



Secretion from the muscle. Gram stain, showing the gonococci.

for gonococci (Fig. 3) show nothing of the muscle structure, but a liberal scattering of diplococci grouped about the nuclei and in the interstices of the muscle fibres. The staining was affected by immersing the specimens for thirty-six hours in a carbolic fuchsin solution in the thermostat. This, on the authority of v. Kahlden, was considered the best procedure, since a prolonged immersion of celloidin specimens in a solution of anilin gentian violet water causes them to be digested.

There are recorded in literature three cases of gonorrhœal myositis based solely on clinical observation. Rona[1] reports two cases. A merchant, aged twenty-seven years, during the course of a chronic urethritis, had pain in the thigh followed by induration the size of a silver dollar. The overlying skin was normal. The induration was very tender, appeared embedded in the fascia, and lasted many weeks. The second case was that of a male, aged twenty-seven years, with fourth attack of gonorrhœa. In the second week of its existence pain at the centre of the left thigh set in, but without fever, yet rest in bed was necessary for two weeks. At the site of pain there existed an infiltration the size of a saucer and very tender, intimately associated with the fascia lata, but in no relation with the overlying normal skin.

Eichhorst[2] reports the case of a male, aged fifty-six years, who had a first attack of gonorrhœa. About the fourth week of its existence he complained of severe pain on the outer aspect of the thigh, and a few days later palpable signs of an induration 8 cm. long and 4 cm. wide set in. The temperature fluctuated between 35° and 38° C. Pains, very severe, lasted a week and then abated, but tenderness to touch persisted. The overlying skin was always normal. The infiltration diminished in extent, but gained in hardness. Lead-water applications were of no avail. Two weeks later the right wrist-joint reddened and became tender and infiltrated. These constitute the only authentic clinically recorded cases in literature, though a case of myositis, the basis of an interesting paper contributed by Treves[3] to the London Clinical Society as myositis of questionable origin in a male afflicted with gonorrhœa seven weeks prior, appears at least to belong here clinically, for such was the opinion of two of the speakers on this occasion. It is likewise probable that a large number of cases of myositis reported in females, classed as pyæmic following the puerperium, rest on a basis of gonorrhœal infection, for such is the contention of Koenig for the postpuerperal arthritis in large number. Eichhorst was not willing, owing to the paucity of observations and the want of pathological proof, to set up a clinical picture, yet this appellation of "sclerosing gonorrhœal myositis" finds justification in the pathological findings for the first time here pictured. The sclerotic process so peculiar to the gonorrhœal process in joints, urethra, and epididymis again manifests itself in the muscles. Bearing on this point is the subsequent course of the new connective tissue formation. In greater part it seems after a variable but usually long period of time to resolve. That the reverse may obtain is gathered from a report by Batut.[1] The latter narrates a case of myositis ossificans of the brachialis anticus in a patient afflicted with gonorrhœa complicated with arthritis. This myositis had its inception in an induration of the entire brachialis anticus. This subsequently became so dense as to intercept the X-rays, and was therefore interpreted as being of bony formation. It was reduced to the size of a nut in four months.

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[1] Rona, S. Ergaenzungsheft 3, Archiv f. Dermatologie und Syphilis, 1892, S. 250.

[2] Eichhorst, H. Deutsch medicinische Wochenschrift, 1899, p. 685.

[3] Treves, F. Transactions of the Pathological Society, London, 1880–1881, vol. xxxii. p. 273.

It was in the expectation of finding pus, inferred from the exquisite localized tenderness and the rise of temperature, that I incised. As already stated, merely a profuse turbid secretion escaped which showed leucocytes exclusively and a very few gonococci. The subsequent protracted course of the inflammation, its spread and eventual retraction point clearly to the futility of the incision in stopping the proliferation, though pain abated instantly. From these half-dozen instances cited, together with the pathological findings in this single case of mine, it is safe to predict that notwithstanding the tendency to resolution some stiffening will eventuate from the residue of connective tissue. Pus formation has not as yet been encountered, and if so it will in all likelihood be traceable to mixed infections.

This location of the gonococcus is explained either as a metastasis in the muscle or as an extension of inflammation from adjoining joints or bones. The latter seems more likely, as in most cases the adjacent joints were affected. That bones can be the seat of a gonorrhœal osteomyelitis, the recent experience of Ullman bears testimony. As in the allied affections muscular rheumatism and myositis ossificans we have found an intimate interdependence of muscle inflammation and the oft associated or preliminary joint symptoms, it is not unlikely, reasoning by analogy, that the primary seat of the metastasis is in the joint or bone, and thence follows by way of the lymphatics the planes of the tissues, preferably the tendons.

The treatment will be largely expectant. For the relief of the pain dry heat, hot salt, or sand bags, as in joint disease, will be found to assuage the pain, aided by local anodynes, guaiacol, gaultheria, and menthol. When the acuity of the process has abated massage is in place. If the intensity of the pain be excessive I believe that an incision will accomplish depletion and relieve tension.

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[1] Batut. Journal des Maladies Cutanees et Syphilitiques, 1900, p. 273.

DOUBLE URETER OF THE RIGHT KIDNEY.[1]

ONE URETER ENDING BLINDLY; ACUTE SYMPTOMS; OPERATION; DEATH; AUTOPSY.

By Charles L. Scudder, M.D.,
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Anomalous conditions of the ureter are infrequent in viable children. A recognition of such anomalies is difficult. A record of the clinical signs in these cases is, therefore, important. The case here reported is of peculiar interest because it is only the ninth recorded instance of the blind ending of a supernumerary ureter, and it was associated with acute abdominal symptoms.

The case under consideration was that of a child, twenty months old, who was well nourished and had been in good health up to this present illness. During the night of June 25th, without previous warning, the child was restless and vomited.

June 26*th*. The following day she complained of stomachache and appeared dull and feverish. The bowels moved naturally after taking castor oil.

27*th*. The child was very ill and presented a pinched and distressed expression. The pulse and respiration were both accelerated, and the temperature was 100° F.

At this time, according to the statement of the attending physician, a sausage-shaped tumor was palpable in the right side of the abdomen. This tumor was soft, elastic, movable, and slightly tender. There was little or no rigidity of the abdominal muscles. A large enema of warm water was returned clear, leaving the tumor unaltered in shape. A few hours later a second evacuating enema was returned clear.

28*th*. The child was evidently not improving. A diagnosis had not been definitely made, although it was thought probable by the physician that there was present an intestinal obstruction, but a third enema caused a normal fecal dejection. The enemata which came away and the fecal dejection were free from both blood and mucus.

Upon this third day of the illness I saw the child at the Massachusetts General Hospital in the regular rotation of emergency cases. The child was fairly well developed, but with pale, sunken cheeks and dark circles under the eyes. The tongue was moist but slightly coated. The heart and lungs were normal. She was restless and crying out as if in pain. She appeared septic.

The abdomen was uniformly distended, almost everywhere tympanitic and tender. The exception to the tympany was in the right iliac region, where there was great sensitiveness and slight dulness. The muscular rigidity corresponded to this dull area. There was an indefinite soft and elastic oval mass felt, extending from the middle of the iliac crest nearly to the symphysis pubis.

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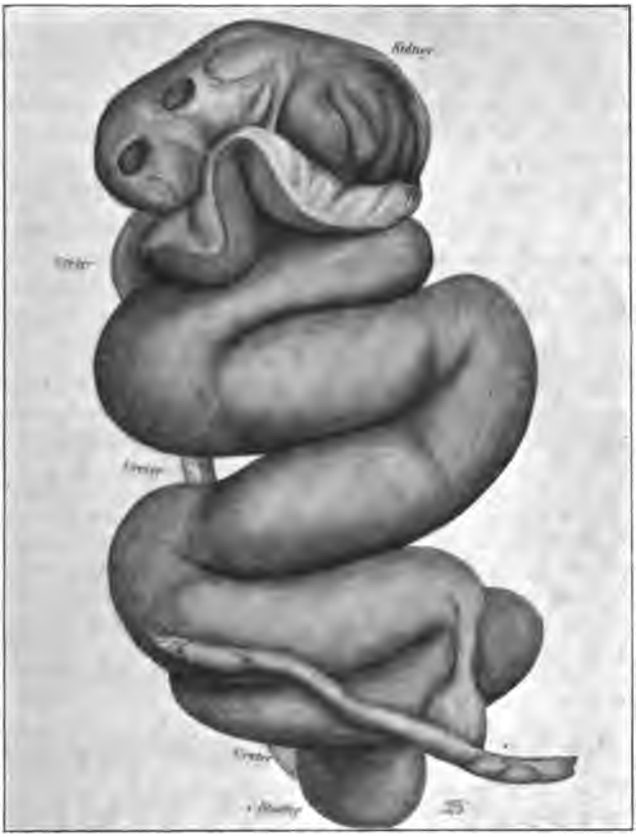
[1] Read at the meeting of the American Association of Genito-urinary Surgeons, Washington, D. C., May 3, 1901.

A suds and glycerin enema resulted in a small fecal dejection. One hour and a half later a high oil enema resulted in another small fecal dejection containing a little mucus. Two observations of the temperature showed it to be fairly constant at 103° F. The pulse was about 140.

A laparotomy was done in the hope of relieving the condition of the child. There was no free fluid in the abdominal cavity. The bowel and peritoneum were normal in appearance. There were no intestinal or omental adhesions. The appendix was normal.



The right kidney is seen at the top of the plate split open along its convex surface. The interior of the kidney is shown. The large intestine-like tube (the supernumerary ureter) is seen starting from the right pole of the kidney and ending in a blind pouch outside the bladder. The other ureter is seen starting from the left pole of the kidney and lying behind the greatly dilated ureter.

The tumor, palpated before operating, was found to be retroperitoneal, and to consist of a large fluctuating swelling extending from the kidney on the right down in curves across the lumbar region and behind the bladder. The left kidney felt normal. The child's condition precluding further operation, the abdominal incision was closed. The child recovered from the anæsthetic and died the next morning.[1]

Report of the *autopsy*, No. 118, by J. H. Wright, M.D., Director of the Pathological Laboratory of the Hospital.

Posteriorly beneath the peritoneum and in front of the aorta, extending across the abdominal cavity in the region of the kidneys and lengthwise from the inferior border of the liver to the floor of the pelvis, is a contorted intestine-like resilient mass. Upon dissection this was found to represent an enormously dilated ureter of the right kidney, filled with a thin, yellowish fluid containing leucocytes and bacteria, and ending blindly as a closed sac about the diameter of the thumb, in the neighborhood of the orifice of the urethra, the internal meatus. It has an extremely tortuous course, running back and forth, generally transversely to the long axis of the body and forming four or five loops closely bound together by connective tissue. At its widest portion it is about 11 cm. in diameter. Its length is probably 45 cm. Its lining membrane is generally smooth and white. Above it merges into a dilated pelvis of the right kidney, which has another ureter and pelvis. The portion of the kidney to which the dilated ureter belongs is a portion of the superior pole about 2½ to 3 cm. long. This portion of the kidney tissue shows opaque grayish streaks and is generally of a grayish, fibrous appearance, with little resemblance to kidney tissue on section.

This part of the kidney is about 10 mm. thick. The entire kidney is large, measuring 9 cm. in length. The part of the kidney corresponding to the other renal pelvis shows a slight atrophy of the pyramids. The pelvis and calices are considerably dilated.

The ureter of this portion runs posteriorly to the dilated ureter and is itself slightly dilated, measuring about 8 mm. in circumference, and ends normally in the bladder. The left kidney is not remarkable.

Anatomical Diagnosis. Duplication of right ureter and renal pelvis. A genesis of the ureteral orifice of one ureter and extensive dilatation, elongation, and tortuosity of the same, with a hydronephrosis and pyelonephritis of the corresponding portion of the kidney. Slight hydronephrosis and dilatation of the ureter of the remaining portion of this same kidney.

The following eight cases are those recorded in medical literature of this anomaly:

Liehler[2] (*Med. Korrespondenzblatt des Wurtemberg ärzll vereins*, Band iv., 1835, p. 23). A girl, three months old, who screamed loudly at every micturition. A tumor presented in the vaginal outlet which had the appearance of a tense bladder. This tumor was replaced, and upon reappearing three days later ruptured. The child died, and the autopsy disclosed a pouch-like blind ending of a supernumerary ureter within the bladder, dilatation of the supernumerary ureter, a partial hydronephrosis of the corresponding portion of the kidney.

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[1] See Massachusetts General Hospital Reports, Surgical Records, vol. xix., p. 32.

[2] Carl Schwarz. Ueber abnorme Ausmündungen der Ureteren und deren chirurgische Behandlung. Beiträge zur klinischen Chirurgie. Tübingen, 15, 1896, St. 159.

Lilienfeld (*Dissert.*, Marburg). He describes a preparation from a man, aged sixty-five years. A pouch-like blind ending of a supernumerary ureter within the bladder.

Osterloh (*Jahrbücher der Gesellschaft für Natur und Heilkunde in Dresden*, 1872–3). In the case of a new-born child there was found a left double ureter. The right ureter was normal. The extra ureter ended in a blind sac behind the bladder. The upper half of the kidney was hydronephrotic.

Heller describes a case in a man, aged seventy-nine years, of great hydronephrosis of half the kidney with a double ureter, the blind end of which terminated in the bladder wall.

Boström (*Beiträge zur path. Anatomie der Neuren*, Freiberg, 1884) describes the case of a five-and-a-half-months'-old child who had a double total division of the ureters. One ureter ended blindly within the bladder, compressing the urethra and the other ureteral orifice of that side.

Geerdts (*Dissertat.*, Kiel, 1887) reports the case of a female child, aged three weeks, who presented a tumor, about the size of the end of the little finger, protruding through the urethra. The tumor could be reduced into the bladder. The diagnosis was inversion and prolapse of a part of the posterior bladder wall through the urethra. At autopsy a pouch-like blind ending of a supernumerary ureter within the bladder and urethra was discovered.

Orthmann (*Centralblatt für Gynäkologie*, 1893, No. 7) reports the case of a girl, aged twenty-seven years, in whom the supernumerary ureter ended in a blind sac projecting as a cyst into the vagina.

Stoltz (*Gazette médicale de Strassburg*) describes a case in which the right kidney had two ureters. There was no left kidney. One of the ureters of the right kidney ended in a cystic tumor, the other ended blindly near the bladder.

BRONCHIAL CONCRETIONS.

WITH THE REPORT OF AN ORIGINAL CASE.

By L. W. Atlee, M.D.,
of Philadelphia.

R. D., aged twenty-nine years, native of Ireland, a fireman in the United States Navy. He is a man of medium height, and very powerfully built and muscled. He was admitted at the Naval Hospital in Philadelphia from one of the ships at the navy yard, the "hospital ticket" giving the diagnosis of his disease as being "bronchitis." Physical examination of the thoracic organs was almost negative—almost, because on the anterior part of the left chest at the second interspace, on the parasternal line, there could be heard some dry, small, harsh râles. The temperature on admission was 101°, pulse 84, respirations 24. The tongue was slightly coated, and there was some anorexia. The subjective symptoms were, in regard to the lungs, sharp pain, increased by cough, referred to the aforementioned spot, and frequent teasing cough. There was occasionally some thin, slightly yellowish sputum brought up. During the succeeding three days his condition showed no change, excepting that the sputum became freer and slightly purulent. This state continued until the eighth day, when his temperature ran up to 104°, and the respirations and pulse became more rapid. The pain was now much more severe at the spot on the left side. We thought we could detect subcrepitant râles and bronchial breathing, and there was dulness on percussion over the place, measuring some three inches in diameter. On the ninth day the temperature dropped to 101°, and the sputum, which had been tenacious and blood-streaked, became thin and yellowish-green. By the twelfth day the temperature began to show a septic (hectic) character, and the sputum was very profuse and intensely fetid. The stained specimens of the sputum showed no tubercle bacilli, though naturally in such a case they were carefully and anxiously looked for. The general health by this time showed the effects of the disease, as the man, from being robust and ruddy, became sallow, and lost much flesh. The profuse fetid expectoration and hectic continued without change until the fourteenth day. On the morning of this date, during a violent spell of coughing, he felt a solid, sharp body come up with the sputum, which he spit out into his spit-cup. He was astonished at the loud sound it made on striking the bottom of the cup, and called the nurse's attention to it. The cup was brought to me, and the concretion removed. It was about three-quarters of an inch long, and conical in shape, the largest diameter being about one-quarter of an inch. That it looked like a piece of necrosed bone will best describe it, and it had very sharp, rough, and jagged edges. A rough chemical analysis gave the reactions for lime and phosphorus. The man's recovery after getting rid of this concretion was almost immediate, and he left the hospital ten days after its discharge, seeming in no way any the worse for his experience.

It is to be regretted in this case that a more extensive examination of the concretion was not made. The history of this man's condition previous to his admission was entirely negative; he had always enjoyed robust health, and knew nothing as to his having, perchance, at any time got any foreign body in his lung.

The most complete work on this subject was done by L. Leroy, in his *Thèse pour le docterat en Medicine*, Paris, 1868; *Les Concretions Bronchiques.* He eliminates foreign bodies from without, but includes all those which have been found in the respiratory organs under three divisions—those found in the bronchial tubes, in the glands near the bronchial tubes and ulcerating through their walls into their cavity, and those found in the parenchyma of the lung.

Historically the references made to this subject by the ancient authors are very indefinite. Morgagni analyzes the cases published prior to him of concretions found in the lungs or thrown off in the expectoration. He mentions that Areteus, Galen, Alexander of Tralli, Paulus Aegineta, have observed concretions brought up in coughing; Fabricius cites an example of a consumptive who threw off a great number; Boerhaave says that Vaillant expectorated 400 very small ones; Benevenius saw a stone expectorated that was nearly as large as a filbert; and Cartulus found in the interior of a lung a stone as large as a hen's egg; Liénteaud and Portal bring together a few short observations from the authors who preceded them, especially Morgagni. From the presence of these numerous and often large concretions arose the disease called "calculous phthisis," admitted by all the writers of the sixteenth and seventeenth centuries, and that Bayle restored to honor in 1810 by the publication of his great work on phthisis.

The ancient authors believed the calculous masses found in the lungs were due to the inhalation of dust, but Laennec believed them to be formed during the healing of tubercles, and that nature had been too extravagant in the deposition of the lime salts. Broussais considered them to be due to the degeneration of tubercles. In one hundred autopsies performed on old people Roger found concretions in fifty-one cases, mostly at the apex. Riellet and Barthez, in two hundred and sixty-five autopsies on tuberculous children, found them twenty-one times. These "lung stones" may, by what Laennec called "a secondary crop" of tubercles around them, be found in a cavity communicating with a bronchus. Subsequently these calcareous bodies—lung stones, as they are sometimes called—may be expectorated (Osler).

The lymphatic glands of the lungs are intimately connected with the bronchi, and where hypertrophied they may encroach on their calibre, and when inflamed they may become adherent to their walls, and thus cause perforation. The different phases of this process have been followed out by Barthez and Riellet (*Med. des Enfants*). In one case a bronchus was perforated by a small cretaceous gland. Situated directly behind the right bronchus was a gland about the size of a small pea, and containing two tubercles entirely calcified and about as large as millet seeds. At this spot the cartilage was eroded and the mucous membrane ulcerated, but to a less extent than the cartilage. A calculus contained in a lymphatic gland may, so it appears, find its way into a bronchus. *Circa divisionem trachea primam vomicæ adhaerenti parti ejus posticæ includebater calculus acutus et aspes, pisi magnitudine.*

The concretions found in the bronchi of tuberculous origin have been of variable volume up to the size of a hazel-nut; the form has been round or irregular; the structure porous; their consistence variable, some being easily crushed between the fingers, others as hard as stone. The color may vary from the whiteness of chalk to a dirty yellow. Microscopical examination, after previous treatment with muriatic acid, shows no distinct structures. Chemical analysis proves them to be composed principally of carbonate and phosphate of lime.

Morbid ossification has been encountered in the lungs as in most of the other organs, and believed to be due to the result of chronic inflammation, and not to senility. Luschka found ossified places in the lungs of a man, aged fifty-four years, who died of chronic Bright's disease. Rokitansky attributed numerous attacks of pneumonia to the presence of two osseous masses in the lung tissue. Foerster, in Virchow's *Archiv*, showed that a lung stone he examined was made up of lung tissue ossified. The passage of these osteoids into the interior of a bronchus by a process of ulceration is probable. Dalmas said he saw these bodies "striking into the bronchi," but perhaps these were only cretaceous lymph glands.

Leroy gives the history of a case in a woman, aged forty-three years, who developed symptoms of pleurisy and effusion on the left side. At the autopsy the left pleural cavity was partly filled with a purulent exudate. A concretion was found in a dilated bronchus which communicated with the pleural cavity by a fistulous tract. No evidence could be found in the lung tissue that the concretion had formed in it, and both lungs were otherwise perfectly normal.

The following case (Leroy) is more happy in its termination, but is not complete, as the French wit said no case could be without a post-mortem. A doctor in active practice in the country began to have an obstinate cough, hectic fever, loss of flesh, and occasional hæmoptysis. There were moist râles and dull percussion sounds under the right clavicle. He continued to go from bad to worse, when one day in a fit of coughing he expectorated two small concretions that looked like the malleus and incus. The health was gradually re-established after this, and seven years later he was perfectly well.

It has been observed that during long-continued irritation the cartilages may become ossified in the non-dilated as well as in dilated bronchi. Later, these ossified portions may become detached from the bronchial walls and lodged in the bronchus. Leroy gives the long history of a case in which symptoms of an abscess existed at the base of the right lung; in a bronchiole close to this cavity three concretions were found, which on examination proved to be true bone or *ossified cartilage.*

As we have stated, most of the ancient writers believed the concretions found in the bronchi were formed there by inspired dust. Morgagni believed they were formed in the bronchi, and relates an instance in which a patient coughed up a concretion "which had its origin in the extremities of the small bronchi and the prolongation of the windpipe"; it had the form of the place it occupied; it was oblong, cylindrical, slight, and was covered with little branches."

It has been said that inspissated mucus could act as a nucleus for the formation of a concretion in a bronchus, the lime salts being deposited on it. Laennec gives a note by Andral: "In the lungs of a man, aged sixty years, who had never had any signs of lung disease I found several calculi, hard as stones, with some branches like the renal stones. These calculi probably had their origin in the bronchial ramifications. The lung tissue was perfectly healthy everywhere."

Leroy extracts from *Bull. et Mém. de la Soc. des Hôp. de Paris*, 1865, p. 6, a most interesting case, particularly with reference to the original case given here, but unfortunately our space will only permit of a short reference to it.

A man, aged thirty-four years, had pneumonia six years ago, since which he has had cough and deeply-felt pain in the right side of the chest. During the past two years every month or two he developed symptoms of a *vomica*, when he had to quit work and remain in bed. There would be great pain, fever, profuse fetid purulent sputum. This condition would last some fifteen days, when he would be able to return to his work. After a particularly severe one of these attacks he had a sudden, brisk hæmoptysis, and while coughing and spitting out the blood he heard a concretion strike loudly in the basin. After this the man completely regained his health. There was no history of his having got a foreign body in his lung, and his work was not dusty. The concretion was not chalky. It was compact and hard, but neither cartilaginous nor bony in its structure. It weighed forty-seven centigrammes and had about a dozen rootlets.

In *Les Bull. Soc. Anat.*, t. xxviii., p. 88, et *Bull. Soc. Méd. Hôp.*, p. 9, Leroy finds the following as showing concretions do form in the bronchus: A man had spitting of blood and signs of pneumonia in the left side. At the autopsy no signs of tubercles were found, and the bronchi were dilated. One of these contained a small chalky mass, which was branched, and around it the lung tissue was pneumonic; the mucous membrane of the tube was ulcerated, but the tube was not perforated. There was a purulent effusion in the pleura.

In the diagnosis of a bronchial concretion we have no specific signs to aid us. The symptoms would lead to the diagnosis of the existence of a phthisical cavity or perhaps to bronchiectasis, "which results from the presence of a foreign body in the air tubes" (Osler). The absence of tubercle bacilli in the sputum will eliminate tuberculosis, and perhaps the Röntgen rays might aid in discovering a concretion of sufficient magnitude.

From the foregoing cases it is seen that ordinarily the patient is troubled for a greater or less length of time with cough, first dry, then followed by mucous or mucopurulent sputum. The physical signs may be those of a cavity, and the general symptoms those of hectic (septic) fever. Dyspnœa, pain, and hemorrhage do not help us. The anomalous character of the symptoms could lead us to suspect their nature. Leroy gives as an example of the diagnostic difficulties in these cases of bronchial concretions the following case reported by M. Barth (*Bull. Soc. Méd. des Hôp.*, 1865, p. 9:

> A young woman had a very serious and obstinate bronchitis, though auscultation gave no signs of its being of a tuberculous character. At a certain period of the disease the expectoration became very considerable, and one morning a concretion as large as a grape-seed was spit up; a little later a second concretion was expectorated. After this the health was rapidly restored. The concretions were believed to have ulcerated their way through the bronchial walls from the lymphatic glands.

Without going into profitless speculation as to the origin of the calculus thrown off in the original case reported, the opinion was formed that the concretion had probably been latent in the bronchus for a long time, and that in some way it was disturbed and caused to act as an irritant, making a *locus minor resistenciæ*, and in the light of modern bacteriology the habitat of the body and its adjoining tissue became infected; hence the bronchitis, the pneumonia, the tissue necrosis, and the happy termination in the freeing and expelling of the body. In this case, previous to the onset of the attack of bronchitis, the man had been employed at some unusually heavy and arduous work, shovelling coal in a coal-lighter. The unaccustomed exertion entailed in the performance of such extremely heavy labor could perhaps have disturbed the quiescent concretion.

PROGRESSIVE MUSCULAR DYSTROPHY, WITH THE REPORT OF AN AUTOPSY.[1]

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AND

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More than twelve years have passed since one (Sachs) of the present writers discussed the subject of progressive muscular atrophy before the American Neurological Association. During this period innumerable contributions have appeared relating to the amyotrophies and the dystrophies, yet many of the same questions which puzzled us at that time remain unsolved. It is generally assumed that the amyotrophies can be easily differentiated—at least clinically—from the progressive primary myopathies; the spinal forms are developed late in life; there is in them no distinct hereditary influence; the wasting begins in the upper extremities, and rarely in the lower; hypertrophy is the exception, fibrillary twitchings the rule, while the electrical changes are more or less pronounced, often leading to a complete reaction of degeneration. Contrast with this the early onset of the myopathies, the distinct hereditary and family taint in the victim of this affliction in whom the first symptoms appear in the lower extremities and not in the upper; hypertrophy is the rule, fibrillary twitchings the exception, while the electrical conditions show no very marked departure from the normal.

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[1] Read before the New York Neurological Society, March 5, 1901.

The simplicity of this clinical scheme is disturbed by the fact that a sufficient number of cases of spinal muscular disease have been reported in adults as well as in children, showing a distinct family taint. Some hypertrophied muscular fibres have been made out in these same forms, and often the electrical changes have been noted to be very slight indeed; on the other hand, the fibrillary twitchings and the reaction of degeneration which have been thought to be thoroughly characteristic of the amyotrophies have also been noted in the cases of primary myopathy. In view of the difficulty of making a proper clinical differentiation, an opinion uttered five years ago may be repeated here, that "it is wiser to be guided by the general agreement of symptoms than by any one single symptom." But even this will not help us altogether out of the difficulty, for Friedel Pick, for instance, reported only lately a case which he had diagnosticated as a spinal form of progressive muscular atrophy, but on post-mortem examination not a single trace of spinal disease could be made out. Similar experiences have led Placzek to decide that, in view of the many difficulties besetting the differentiation between the various groups of progressive muscular atrophy, it would be wiser not to attempt to distinguish between them and to regard all of them as belonging to a single morbid entity. It is doubtful, however, whether it is necessary at the present moment to accept this extreme view.

Remembering, also, that it is uncertain whether the peroneal form of progressive muscular atrophy should be classified with the amyotrophies, or whether it is properly designated as a progressive neural atrophy, we are bound to admit that the clinical distinction between the various amyotrophies and dystrophies is not as firmly established as we could wish. As between a progressive neural atrophy and an amyotrophy, the neuron theory will help us to account for the lack of a sharp line of demarcation in the symptomatology, and will also help to explain the difference in the anatomical findings of the cases of progressive neural atrophy hitherto reported, some authors finding distinct changes in the spinal cord and others denying the existence of these, and maintaining that the peroneal form is due solely to a peripheral nerve lesion. There is, indeed, a strong possibility that in some instances the distal end of the neuron, and in others the central end, may be more distinctly diseased; the clinical manifestations of such lesions would, however, differ but very little. One would, nevertheless, be justified in looking for a marked differentiation between the primary myopathies and the amyotrophies, unless it could be shown that even in the myopathies it is the distal end of the neuron which is first affected. Such evidence has not been furnished in abundance, although a lady physician, Dr. Saccara-Tulbure, has claimed to have found distinct changes in the terminal endings of the nerves in the muscles in a case of pseudohypertrophy. She insists that, by methods which she employed, she could make out a distinct diminution of the tufts and fibres in the terminal muscular plates. It is a little unfortunate that the case in which she has found this was not an entirely typical case of pseudohypertrophy, although it was allied in all probability to the group of progressive dystrophies.

In former years much stress was laid upon the histological structure of the muscles in the two groups of cases, and we were inclined to believe that the simple examination of a piece of muscle removed during life or post-mortem would help to establish a positive diagnosis. In the muscles removed from dystrophic patients hypertrophied fibres were abundantly in evidence, or else fibres that had undergone simple atrophy. In amyotrophies hypertrophied fibres were not found, and there was a marked degeneration, not a simple atrophy, of the muscular tissue. But since that time it has been shown by a number of authors that hypertrophied fibres occur in purely spinal affections, in infantile spinal paralysis, and in syringomyelia, for instance; while, on the other hand, Hoffman maintained, with good reasons, that simple atrophy of the muscular fibre occurs in the spinal forms of progressive muscular atrophy. Moreover, the question is still open for discussion whether or not the gray matter of the cord is affected in the primary dystrophies, and, if affected, whether such changes are primary or secondary. Erb, Pick, Kahler, Heubner, and others have reported changes in the gray spinal matter in cases of primary dystrophy. Erb and Strümpell regard these changes as secondary, but in the case of Strümpell, Hoffman, whose authority in this matter could hardly be questioned, doubts whether the case upon which the argument was founded was a primary dystrophy at all. In the attempt to reconcile conflicting views, Erb has interjected the further proposition that all the progressive myopathies (whether or not there be anatomical evidence of central nervous disease) are of neuropathic origin and due to *functional* disturbance of the trophic centres, and that the results of such disturbance of the trophic centres would be evident first in the parts furthest removed from these centres, namely, in the muscular tissue.

It is difficult to prove or to deny the truth of such speculation, but it would seem to us that if purely functional changes are to account for such a wide-spread disease as is progressive myopathy some slight structural change might be made out in the gray matter of the spinal cord in patients who have survived for many years the onset of the disease. The first case, upon which we report in detail, will offer valuable evidence in this direction, and the value of it is increased by the fact that the latest staining methods and the best technique have been employed by Dr. Brooks in his examination of the nerves and muscular system. We propose to show by the records of this case that in a progressive muscular dystrophy, lasting over fifteen years, the anatomical findings in the spinal cord were practically negative. In this special case the disease began as a typical pseudohypertrophy, but as the boy was one of a family of three in whom the second brother developed a characteristic juvenile form of progressive muscular atrophy, and another brother also developed a muscular pseudohypertrophy, we may infer that the negative findings of this case have a special value with regard to all the forms of progressive muscular dystrophy.

The clinical history of the patient, J. K., cannot be given with fullest details, because, unfortunately, some of the earlier records of the case were not retained at the Montefiore Home, into which institution the boy was admitted on December 15, 1889. But the loss of the earlier records matters little, for the boy was under observation for a period of nearly eleven years at the home, and during these eleven years his condition changed but very little. He died of pneumonia March 15, 1900. At the time of his admission he was thirteen years of age; was born in Russia; his parents were alive and well at that time. A younger brother had suffered from a similar affliction. This boy was also transferred to the home, where he died in 1898 of cardiac disease. He presented the clinical symptoms of Erb's juvenile type. Unfortunately, no autopsy was obtained. A third brother has the ordinary form of pseudohypertrophy. His present condition is unknown to us. There was no history of any other taint in our patient's family.[1] Early in life J. K.'s parents noticed constant movements of the head and of the eyes. He was practically well until the age of ten years, when he had a fall and is said to have broken his left leg. He was confined to bed a few weeks, recovered from the injury, and could walk about until one year later, when he fell again, and for a second time is supposed to have broken his leg at the same point. He recovered from the second fall, but could not walk about as well as formerly. One year before admission, at the age of twelve years, he was stricken with typhoid fever; was confined to his bed for two weeks, and when he arose from his sick bed and attempted to walk his parents noticed that he could not get about. A few weeks after this he could not walk at all. The hypertrophied calves were very striking at the first examination, but they had not attracted the attention of the parents. Barring a slight progression in the atrophies of the muscles, the boy's condition changed so little that it may be summarized as follows: The head was large, undergoing constant rotary movements, congenital nystagmus, macroglossia, and thick speech, all of which may be taken as distinct stigmata of degeneration, as has been noted in other cases of pseudohypertrophy. His general intelligence was fair. He was instructed while at the Home, and became a very assiduous reader. There was a marked atrophy of all the muscles at the shoulder girdle, the upper arm and forearm, the muscles of the hand alone preserving anything like a normal configuration, but the grasp of the hand was almost *nil.* He presented typical "loose" shoulders. The deep spinal muscles were intensely atrophied and caused distortion of the spinal column and trunk. The thigh muscles were atrophied, the calves remaining large and tough to the very end, although they had become diminished in size during the last few years. Both feet were club-shaped and in extreme valgus position. The exact measurements are given in the pathological report, and mention of them is therefore omitted from this clinical statement. During the last five or six years of his life the boy was only able to use his facial muscles and to hold his head erect when sitting in a chair. He was totally unable to raise his head from the pillow or to perform a single movement of the trunk or of the limbs. He had to be lifted about, as it were, *en masse*, and was a dead weight in the truest sense of the term. With the few exceptions above noted, the entire muscular system was useless. The case was, therefore, an extreme illustration of a progressive muscular dystrophy of a pseudohypertrophic type. The reflexes were, of course, absent. In the earlier years there was some response to the faradic current, which disappeared as the atrophy increased. The vesical and rectal reflexes remained normal to the very end. The general health was good, and if it had not been for the onset of pneumonia the boy might have lived for many years.

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[1] The pictures of these three brothers will be found in Sachs' Nervous Diseases of Children, pp. 422, 423, 424.

Pathological Report. The necropsy was performed twenty-four hours after death.

"The body is that of a small male. It shows great general deformity, and is much smaller than normal for a subject of this age, being about the size usual in a boy of fourteen or fifteen years. The head is, however, of natural size, and consequently appears proportionately very large to the small and wasted trunk and extremities.

"The face is asymmetrical, the right side is puffy, flabby, and has a paretic appearance not unlike that seen in myxœdema; the left side is much more natural, and has a more intelligent look. There is a scanty, fine growth of brown beard and moustache. The left eye and eyebrow are elevated, and the pupils are dilated irregularly. The nose is broad, short, and the alæ nasi are very thick and heavy. The oral cavity is very broad. The teeth are irregularly placed and badly shaped. The tongue is large, broad, and very thick, though proportionately thin at the tip, which is somewhat deviated to the left. The ears are large and project well from the head. The Darwinian tubercles are, however, small. The general expression of the features is dull and passive, and somewhat simulates the facial aspect of acromegalia.

"The forehead slopes back sharply and the integument covering it shows several deep transverse folds. The entire head is vertically elongated, so that the occipital protuberance projects but a short distance posterior to the line of the neck. The scalp is covered with a thick growth of fine brown hair, darker in color than the hair on the face.

"The neck is small as compared to the head, but is about proportionate to the trunk. The sternocleidomastoid muscles are contracted, and the head is rotated slightly to the right.

" Both arms and forearms are small, and their musculature is soft and flabby as well as scant in amount. The hands are small, delicate, and well formed. The fingers are medium flexed. The entire upper extremities may be said to be generally atrophied, the condition being much less marked in the hands than elsewhere; it seems like a passive atrophy, the hands being probably less atrophied on account of their greater functional activity.

" The thorax is greatly deformed. The entire cage is deviated laterally to the left, so that the right side projects sharply forward, the lower border returning to jut out toward the right. This deformity is caused by a marked latero-posterior curvature of the spinal column, the greatest deviation of which is to the left.

" The curvature of the spinal column causes a compensatory deviation of the pelvis to the right, so that its median line lies about 6 cm. to the right of the axis of the thorax and in the line of the head and neck. The blade of the right iliac bone is also deflected to the left, so that its crest reaches beyond the median line of the pelvis. The left ilium is correspondingly but much less deviated.

" The external genitals are small, but are normally formed.

" The lower extremities are very short, even as compared to the thorax. Both are flexed at the knees, and when extended the right measures, from the great trochanter to the plantar surface of the arch, 71.5 cm., and the same measurement on the left gives 73 cm. The musculature of the lower extremities is scant, that of the left side being of somewhat greater volume than that of the right. The musculature of the thighs and buttocks is small in amount, but is unusually solid to palpation. The calves are of small volume; at the point of greatest diameter the left measures 27 cm. and the right 25 cm. The peculiarity of these muscles is the curious wood-like, inelastic impression which they give to the palpating hand; in this they contrast very markedly with the soft and flabby muscles (though equally atrophied) of the upper extremities and neck. The feet are inverted so that the plantar surfaces are almost parallel. Both tendo Achilles are so contracted by the retraction of the calf muscles that the toes are drawn nearly to the axis of the shanks. The feet are thickened laterally, but are short, very firm and solid, resisting pitting almost completely, although they have the appearance of being œdematous. The circumference of the right foot at the arch is 26.4 cm., and the same point on the left gives a diameter of 23.8 cm. The length of the left foot from the tip of the os calcis to the end of the great toe is 18 cm., and that of the right foot 17.2 cm. The relative atrophy of the calf muscles is very apparent when one compares these measurements with those of the calves. The toes are all sharply flexed as though from contracture of the plantar muscles and tendons.

"The thoracic musculature is very small in amount, but that of the abdomen is more abundant, and the muscles here are of more natural color and consistency, though they show in lesser degree the changes which are most extreme in the greatly wasted pectoral muscles in which muscle tissue has apparently been substituted by strands of fibrous-appearing tissue of unnatural firmness and inelasticity.

"The lungs are collapsed, permitting a large exposed præcordia.

"Both pleural cavities are free and normal.

"The pericardial sac contains 20 c.c. of clear, light-colored serum. The epicardium shows a few areas of opalescence, which are most numerous, thickest, and largest over the left ventricle. The left ventricle of the heart is widely distended, while the right ventricle is collapsed. The aorta has a diameter of 5 cm. just above the sinuses. The aortic valves are normal, but there is a relative insufficiency of the mitral segments. The valves of the right heart are normal throughout. Both auricles contain small post-mortem clots, but the ventricles are for the most part empty. The myocardium shows a great diffuse fibroid infiltration, which is most extensive in the wall of the left ventricle, where it is distinctly patchy in distribution. The intima of the aorta and the endocardium is slightly thickened in places, but hardly enough so to be considered a pathological state. The coronary arteries are normal in appearance. Weight of heart, thirteen ounces.

"The aortic arch throughout the ascending and transverse portion shows a moderate arterio-sclerosis, which is not, however, continued into the carotids or other large branches.

"The lungs are moderately congested. There are several calcified tubercles in both apices, and a few scattering tubercles throughout the substance of both lungs, but in every instance the tubercles are surrounded by a dense, usually calcified capsule, and all are apparently quiescent. The tip of the right lower lobe is involved in an extensive area of recent bronchopneumonia, and the bronchi distributed to this area are filled with a thick, yellowish pus.

"The tongue is very large. It measures from tip to the base of the epiglottis 14.5 cm., and is 7.6 cm. broad at its widest part. It is 3.6 cm. in thickness.

"The lymph nodules of the posterior dorsum are enlarged and moderately injected.

"The lymphatic tissue of the pharynx is generally hypertrophied It is otherwise normal.

"The thyroid gland is of usual size. The thymus body still persists and is proportionately as large in size as in the child. The tissue seems to be of the same structure as is found in the infant.

"The lymph nodes of the cervical and bronchial chains are moderately enlarged and pigmented.

"The diaphragm is relaxed, it presents no abnormality in texture or thickness, and the smooth muscle tissue making it up seems to be perfectly normal.

"The liver is small and somewhat irregular in shape. Its structure is normal.

"The spleen is enlarged to about three times its usual size. Its tissue is deep mahogany in color, firm and congested. The Malpighian bodies are apparent to the unaided eye, and the connective tissue of its septa seems to be somewhat increased. There are two spherical supernumerary splenic nodules, each 2 cm. in diameter, near the hilus of the organ. Weight of spleen, six ounces.

"The omentum and mesentery are scant in adipose. The mesentery lymph nodes are moderately enlarged, and are very firm in consistence, apparently from fibroid increase.

"The stomach is small. It contains 200 c.c. of normal appearing chyme. The mucous membrane seems to be natural, and there is no apparent disease of the muscle coats.

"The duodenum, jejunum, and ileum are entirely natural. The amount of fecal content is normal.

"The vermiform appendix is folded into a small coil and is bound to the posterior surface of the caput coli by old bands of adhesion. There are no evidences of acute inflammatory process.

"The large intestine is normal.[1]

"The pancreas is large; it is very firm, light in color, and of apparently normal structure.

"The adrenal bodies are small, the cortex is light yellow in color, and the medulla a deep red. There is no gross lesion.

"The kidneys are of about the usual size, but the left organ is considerably deformed, apparently from the pressure exerted on it by the deviation of the spinal column. The markings are fairly distinct. The capsules are not adherent, and the organs are quite natural in appearance save for a general but moderate congestion of the bloodvessels. United weight of kidneys, six ounces.

"The ureters are normal.

"The urinary bladder contains about 500 c.c. of normal urine. The mucosa of the cavity is normal, and there is no apparent disease of the muscular tissue.

"The prostate gland, urethra, testicles, and penis are all small, but are in perfectly normal condition.

"The large abdominal bloodvessels follow the deformities of the spinal column in their course. The intima of each shows a moderate amount of arterio-sclerosis, the process being less apparent in the smaller trunks.

"The skullcap is thin and quite deeply arched, though the fossæ on both sides are rather shallow, the arching being, however, somewhat more free on the left side. The configuration of the base of the cranium is normal, and it presents no deformity.

"The dural sinuses contain a small quantity of dark, partly clotted blood.

"The dura is normal. The pia-arachnoid is somewhat congested, but is not thickened and not adherent.

"The brain is of good size, is fairly symmetrical and its tissue is firm. The bloodvessels of the base are in normal condition, and those throughout the brain tissue are but moderately congested. The convolutions of the cerebrum are not particularly abundant, but they are quite typical, symmetrical, well formed, and ample, while the sulci are moderately deep. The cortical layer of gray matter is thick and regular. No gross lesion is present in any part of the encephalon.

"The pituitary gland is of usual size and apparently of normal structure.

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[1] Muscular alterations in the coats of the intestinal tract were especially sought for but the findings were entirely negative.

"The membranes of the spinal cord are negative.

"The posterior root ganglia are normal to the unaided eye; they are large and firm, but not abnormally so.

"On inspection, and on section, the various levels of the spinal cord seem to be normal; it is not abnormally firm, and the appearance of the white and gray matter to the unaided eye shows no peculiarity, and the differentiation is normally distinct.

"Examination of many of the peripheral nerve trunks from various parts of the body showed no gross abnormality in any, and the amount of perineural fat seemed in each case to be neither increased nor diminished.

"The inguinal lymph nodes are considerably enlarged, the enlargement being apparently of a fibroid character.

"No lesion of the smooth involuntary muscles in any part of the body was found.

"Nearly all the voluntary muscles showed fibroid substitution to a greater or less degree, varying greatly in amount but apparently always of the same character."

The following muscles were especially examined:

"The psoas muscles show an extensive fibrosis.

"The muscles of the back are universally of small volume, and all show extensive fibroid replacement, being light in color, very firm, and inelastic. In places there is an extensive replacement with a firm fibroid yellow fat. The fibres of the latissimus dorsi can be identified in a few places, but are mostly unrecognizable. The trapezii are very extensively invaded. The rectus capitis group are perhaps somewhat less involved, but are very firm, retracted, and inelastic. Even the muscles of the scalp show extensive fibroid changes perfectly evident to the unaided eye, but the most extreme of all the lesions of the muscle tissue is to be found in the muscles of the calves where the tissue cannot be recognized as muscle, being wholly transformed into a diffuse solid mass of firm yellowish-white tissue, apparently made up of mingled areolar tissue and fat, and in which the substituted muscle blends so completely with the structure of the tendons that it is impossible to say where muscle leaves off and where tendon begins. This tissue is of almost wood-like density. All the tendons and fasciæ of this region are much contracted.

"Cause of Death: Bronchopneumonia and fibroid myocarditis, complicated by progressive atrophy and fibrosis of the voluntary skeletal muscles."

As the tissues were removed from the body they were immediately placed in various hardening fluids. After they had become sufficiently fixed and hardened they were placed in 80 per cent. alcohol for preservation. The microscopical study was begun about five months after the time of death.[1]

These examinations were conducted with care and in great detail; as the findings were, however, largely negative they will not be given in full, but only the points of greatest importance will be considered.

The most pronounced changes of the voluntary skeletal muscles were found in the muscles of the calves. Sections of the soleus and of the gastrocnemii showed an almost complete substitution of muscle elements by a firm, dense growth of areolar connective tissue, everywhere of an adult form and with no evidences of recent cell growth or fibre production. In places the areolar tissue had become transformed into a very dense variety of adipose, characterized by the small size of the fat cells and the relatively great amount of large and densely arranged connective tissue fibres. Occasionally remnants of voluntary muscle fibres were found, but they were rare, very small, usually wholly without nuclei, and cross-striation was indistinct or absent.

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[1] We are indebted to Dr. Isador Unger, U. S. A., for the preparations of the tissues of this case.

Sections of the right psoas muscle showed similar conditions qualitatively, but here muscle fibres were much more abundant and more natural in appearance. The hyperplastic areolar connective tissue was of the same type as that found in the calf muscles, and there were also no evidences of recent connective tissue proliferation. Of the muscle fibres that remained few could be called natural; most of them were either larger or smaller than the normal, varying from small to very large, while other fibres were contracted at one point and expanded at another. Cross-striation was evident in most fibres, both large and small, and some showed this feature even more plainly than normal. Many of the cells enclosed a fine brown pigment, and in such cases there was generally more or less granular disintegration of the sarcoplasm with a corresponding indistinctness of cross-striation. Still other fibres showed the sarcoplasm mostly transformed into large fat-containing globules which were still invested by sarcolemma. Nuclei were present in most of the cells, and when present they were usually in greater number than normal and were to be seen in rows of from three to eight, just beneath the sarcolemma or extending deep into the sarcoplasm. This was especially shown in those cells which presented the more advanced stages of degeneration without fatty disintegration. Some of the supernumerary nuclei exhibited karyokinetic-like figures; usually these were atypical, and not true mitotic figures. These evidences of progressing nuclear multiplication were much less frequent than is generally found in cases of acute or progressive muscular atrophy.

The changes in all the other voluntary muscles were of a precisely similar character, varying only in the extent of the alterations. Next to the calf muscles the pectoral groups seemed most involved, though here the amount of connective tissue hyperplasia seemed to be proportionately less as compared to the muscular atrophy. The lesions were least marked in the occipital muscles, where the amount of connective tissue hyperplasia was less and the degenerative manifestations of the muscle fibres not so far advanced. Complete degeneration of the sarcoplasm was rare in these muscles, but nuclear proliferation and hypertrophic fibres were frequent. Karyokinetic-like figures were common in the chromatin of the cell nuclei, much more so than in any of the other muscles. While the atrophic changes in the fibres of these muscles were less advanced, yet no evidences of active proliferation of the cells of the connective tissue could be made out. In a few places there were collections of small round cells, situated in the region of arterioles or capillaries where they probably represented a certain degree of true inflammatory process.

Examination of the various distributions of smooth muscle tissue failed to show any evidences of degeneration or of hyperplasia of the connective tissue forming its framework, beyond a certain small amount of proliferation of the connective tissue surrounding the bloodvessels, which was found to be a general condition throughout all the tissues. Of the involuntary muscles so examined the chief were the diaphragm, the muscular tunics of the urinary bladder, of the stomach and intestines, and the muscularis of the medium and small sized arteries.

Microscopical examination of the heart muscle showed a much less degree of interstitial increase than the gross appearances led one to expect. The wall of the left ventricle exhibited a moderate augmentation of interstitium, the hyperplastic tissue being entirely of an adult type and being most abundant about the vessels. The papillary muscles showed proportionately a much greater interstitial increase. The cardiac muscle cells were found everywhere to be in a very natural condition, and, notwithstanding the apparent degeneration noted in the gross examination, there was no atrophy of the cells, no abnormal pigmentation, and no evidences of abnormal nuclear activities.

Sections of the lung taken from the pneumonic areas showed the ordinary picture of pneumonic consolidation. Sections from the uninvolved portions showed a moderate degree of emphysema, a general congestion of the capillaries, and a considerable anthracotic deposit in the lymph spaces about the air sacs. The larger vessels of the lung tissue showed an increase of the perivascular interstitium, but without any evidences of a recent process. Where the sections included small bronchi, their mucosa was found considerably congested.

Sections of the persistent thymus body demonstrated it to be made up of diffuse adenoid tissue with occasional spheres of condensation. Hassalls' corpuscles were rather less numerous than is usually the case as found in early childhood.

Sections of the thyroid gland showed no deviation from the normal.

Examination of sections of the pituitary body showed acidophylic cells numerous in the glandular portion, but no distinct lesion was found in either glandular or neural lobe.

The vessels of the adrenal bodies were found considerably engorged, and there was a moderate increase in the connective tissue framework of the glands. Examination showed no abnormality of the parenchyma.

Examination of the liver demonstrated a considerable general dilatation of the portal capillaries with congestion. There was a moderate degree of connective tissue increase in the capsule of Glisson, which was, however, devoid of all evidences of recent proliferation. Some of the liver cells contained more than the usual amount of pigment, but the fat content of the liver cells was not above the normal. The hepatic parenchyma may be said to have been practically in a natural condition.

Sections of the spleen showed a considerable degree of congestion, especially of the blood spaces. There was a general thickening of the capsule and of the septa. The Malpighian nodules were well differentiated and normally abundant. There was a large deposit of coarse, black pigment in the cytoplasm of the liver cells, free in the tissue, and distributed throughout the capsule and septa diffusely and in the connective tissue cells.

There was also an extensive anthracotic pigmentation of the lymph nodes of the neck, and to a lesser degree the same was present in the nodes of the mesentery and of the abdominal chains. The connective tissue increase in the lymph nodes was very small, and the moderate hypertrophy of the bodies seems to have been due to congestion and to pigmentation.

The pancreas was found normal, save for a slight increase in the amount of connective tissue.

The stomach and intestine showed nothing abnormal. These sections were examined particularly for alterations in the smooth muscle.

Sections of the kidney showed a considerable increase in the amount of connective tissue, the hyperplastic tissue being found both in the adult and in the actively proliferating forms, though areas showing recent growth were found only occasionally, the chief hypertrophy being in the adult form. There was a moderate general congestion of the vessels. The parenchyma in places showed a few granular and degenerated cells, but was as nearly normal as can be found in the adult human kidney under ordinary conditions.

Sections of the urinary bladder showed no abnormality.

The bloodvessels as found through the various tissues universally showed an increase in the amount of connective tissue surrounding them and uniting them to the adjacent structure. Few exhibited subendothelial hyperplasia to any considerable degree, and the inner coat of the intima was found almost always in a normal condition. No areas of perivascular infiltration were found, except as noted in the occipital muscles, and even in the sections of the extensively diseased muscles the blood channels seemed to be in a comparatively normal condition. No evidences of new vessel formation were found, and apparently the connective hyperplasia in the diseased muscles took place, largely independent of any marked vascular alterations.

Numerous peripheral nerves were examined, both in sections of the diseased muscles and as separate trunks, especially prepared to show fibre degeneration if that lesion were present. No fibres were found which showed degeneration of appreciable extent as demonstrated by the methods utilized (Müller's fluid fixation with Pal-Weigert staining; Marchi's fixation; alcohol and formalin hardening with hæmatoxylin and eosin, and Van Gieson's stains). Some of the larger trunks, as the crurals and sciatics, showed a considerable increase in the amount of endoneurium, but close observation showed this hyperplasia to be clearly of a perivascular type, originating about the small arterioles of the trunk. Sections of the atrophied muscles, which included nerve trunks, showed a perceptibly less amount of connective tissue hyperplasia in the make-up of the nerves than in the surrounding tissue.

Sections of the cœliac sympathetic ganglia fixed in alcohol and stained after the method of Nissl showed absolutely no changes which could be looked upon as degenerative, although occasionally a few cells did show more than the ordinary amount of brown pigment deposited in the cytoplasm.

Unfortunately, only a few posterior root ganglia were properly preserved for study by the Nissl method. Those which were so fixed universally showed identical lesions. These lesions consisted in a shrinkage of the ganglion cells, in many cases similar to that produced occasionally by fixing agents, but here the irregular perilymphatic spaces enclosing the shrunken cells were found filled in with the proliferating capsular cells. This would seem to indicate that cell shrinkage had taken place long before death, and that it was distinctly a pathological process. By far the greater number of ganglion cells showed a natural condition of the Nissl bodies, but occasional cells, especially the shrunken ones, were found in which an almost complete chromotolysis was present; chromolitic changes of moderate degree were still more frequently found. Chromophylia was present in a few instances, and was usually peripheral, rarely involving the entire cell cytoplasm. Nuclear changes were wholly wanting. The amount of coarse, brown pigment normally present in these ganglion cells seemed to be augmented in a few cases, and an identical pigment was occasionally found free in the stroma of the ganglion in more than natural amounts. Apparently the connective tissue stroma of the ganglia had been considerably increased, but there were no indications that this process was still advancing.

The histological examination of the spinal cord was thoroughly made, each separate segment being studied, usually by several methods, in order that different types of tract or cellular degenerations might be sought for.

The connective tissue throughout the entire cord was found to be increased, the hyperplasia in each part being strictly of a perivascular origin and of but a moderate degree. The bloodvessels of the cord were universally congested, but this congestion was apparently of a hypostatic nature. There were no indications of an inflammatory process in any part, except in the perivascular increase of connective tissue, which was obviously of a chronic character and probably but a localized manifestation of the general process.

Degenerated tracts were absent in every part of the cord. This conclusion was reached after careful study, utilizing the stain of Pal-Weigert and corroborating these findings by Marchi's method. Occasional isolated degenerated fibres were found (if we may depend absolutely on the methods employed), and these were usually in the columns of Gall or Burdach, but nothing in the nature of a systemic degeneration was indicated in any level.

Morphological changes in the ganglion cells of the spinal cord were entirely absent, and sections stained with Nissl blue demonstrated that the cytoplasmic and nuclear structure of the ganglion cells, in so far as can be determined by this method, were also for the greater part normal. Occasional ganglion cells presenting different types of degenerations as demonstrated by this method were, however, found, and it is necessary that these be considered in more or less detail.

In the cervical region the ganglion cells of the anterior horns showed in a few instances a slight nuclear eccentricity; the most common chromatophilic change in the cells of this region was a clumping of the chromatic substance into several larger and darker staining bodies while the intervening network and the remaining plaques, though they could be seen, refused the stain to a more or less degree, apparently because these chromatic elements were very finely divided. Cells were found very rarely in which there was no apparent reaction to the dye; usually, however, plaques could be faintly seen even in these cells. The dendrites universally retained their response to the stain, though in some instances the chromatic bodies seemed to have been broken up into very finely divided granules. The posterior horn cells showed degenerative alterations with equal rarity, and where change was noted it usually consisted of a finely granular disintegration of the plaques, which resulted in a more or less diffuse staining of the cytoplasm. This was limited to no particular group or variety of cells. Occasionally the achromatic elements stained to a slight degree. No nuclear changes were noted in these cells.

In the dorsal portion of the cord peripheral chromotolysis was infrequent, but the most common alteration was a perinuclear chromotolysis with a clumping of the chromatic substance in the peripheral portions of the cytoplasm. In those cells where the chromatic substance was more or less clumped the intervening unstained plaques were frequently made up of very finely divided chromatic granules. The network in the faintly stained archochromes was always very evident, even though it had refused the characteristic stain. Nearly all of the cells which showed these degenerative alterations still showed a normal arrangement of the chromatic elements of the dendrites. Eccentricity of the nucleus was found much more commonly in the dorsal cord than in the cervical segments. Not infrequently the cells which showed perinuclear chromotolysis presented a more or less marked nuclear chromotolysis as well, in which case the outlines of the nucleus blended very closely with the net of the cytoplasm. Alterations in the cells of the posterior horns were more infrequent than in the anterior horn cells.

In the lumbar cord chromolitic changes were still more rare. The most common lesion consisted in a finely granular subdivision of the plaques with a corresponding loss of staining affinity; usually this process did not involve the entire cytoplasm. Perinuclear chromotolysis was much less frequent than in the dorsal segments. A few of the lumbar cells showed an unusual amount of brown pigment collected about the nucleus.

As the brain had been hardened for the purpose of tract study, the ganglion cells of those centres could not be studied by the more recent methods. It seems very improbable that any lesion would have been found had the study been made.

The chief lesions which bear on the general condition may be summarized as follows:

Extensive atrophy, which affected nearly all the voluntary skeletal muscles, and was confined to these muscles.

Production of diffuse areolar connective tissue and adipose tissue which replaced the substance of the atrophied muscle.

Slight general perivascular connective tissue hyperplasia.

Moderate interstitial myocarditis.

Extensive degenerative changes in a few of the cells of the posterior root ganglia.

Rare and irregular types of cytoplasmic alterations without morphological change in the ganglion cells of the spinal cord.

1. Atrophy of voluntary muscles seems to have affected nearly all distributions of this tissue, though in markedly variable degree. Both history and pathological examination indicate that this process first began or was at least most rapid in the muscles of the calves.

As to the character of this process, in so far as can be determined by histological examination, it differs in no way from the atrophies which result in many widely different conditions, as from section of nerve trunks, disease of the descending tracts, or even from injuries affecting the muscle tissue direct. It is highly improbable that there are any specific modes by which voluntary muscle fibres degenerate, as has been intimated by some authors.

The process may differ in rapidity or location, but follows on certain well-defined lines, and, as in Wallerian degeneration, is probably wholly unaffected by its etiology, excepting in degree and in reparative efforts. Everything points to a slow progression of the proces,s which was doubtless inaugurated in but a limited distribution of the tissue, subsequently affecting all voluntary striated muscle.

That the atrophy of the muscle fibres preceded connective tissue hyperplasia is indicated by the conditions found in the less extensively involved muscles, where obviously the process is most recent. As an example we may cite the picture presented in the occipital muscle.

Complete absence of the changes in the smooth muscle shows that the disease process was not a general one of all muscle tissue, but was strictly localized in the voluntary muscle distribution.

Since the muscle cells of the heart showed no variation although there was a moderate interstitial increase in this viscus, we also exclude striated involuntary muscle from the involved tissues.

2. We do not look upon the connective tissue hyperplasia which took place in the process of substitution of the atrophied tissue as a primary evidence or manifestation of the disease. Everything points to the fact that the connective tissue increase was but an example of the universal function of this tissue, which by its growth fills in and replaces tissue of any form when it becomes extensively diseased or is removed.

The fact that this tissue in its growth followed natural tendencies, passing from a proliferating, semi-embryological form to a normal adult type, shows that the growth was not of itself pathological, but that it was directly allied to the normal conservative process familiarly known and described in scar formation.

3. Perivascular connective tissue hyperplasia though general was of slight degree. Of such extent it is found more commonly than not, and it certainly cannot be considered a lesion typical of the disease or produced by it. It cannot be a causative factor, or the atrophic changes found only in the skeletal muscles would also have been found in other structures.

4. Probably the moderate degree of interstitial myocarditis was associated with the connective tissue hyperplasia of the bloodvessels. Possibly it was a primary process incited by overaction of the heart or by some other and unknown cause. There is no reason why we should look upon this as in any way connected with the factors producing atrophy of the voluntary muscles.

5. We certainly must admit that the changes found in the posterior

root ganglia are of great significance. Actual morphological alterations in the cells, as well as extensive cytoplasmic changes, cannot be attributed solely to the terminal infective process or to post-mortem decomposition. It is not so clear, however, that these bear a direct relation to the atrophy of the voluntary muscles. The fact that so few of these cells were involved while the extent of the muscular atrophy was general must exclude these lesions from our consideration as primary. That secondary alterations in the ganglia might result from primary disease of the muscle seems more probable. This last is our interpretation of the degenerations, which are then secondary in nature and perhaps dependent on death or extensive disease of certain of the terminal portions of the neuron—that is, of the sensory nerve endings of the involved tissues.

A process similar to this results after amputation, especially if, as Schaffer points out, the subject be young. The cell degenerations in amputation develop very slowly, as is also the case in this condition. Undoubtedly changes in the peripheral sensory fibres precede the ganglionic degenerations. They were not observed in this case, probably because the methods now at our command are insufficient to demonstrate slight changes in single fibres of the nerve bundles.

6. We naturally look for changes in the spinal cord in processes of this nature which are progressive and so symmetrical in location as to at once attract attention to the probability of a central lesion. The majority of previous researches in this disease have, however, tended to show the absence of such lesions. It seemed, nevertheless, possible that these negative results may have been brought about by deficient or faulty methods of research, and for this reason it is important that, as newer methods of investigation are elaborated, the ground be gone over again in the hope that more perfect methods may give more certain results.

On this account our chief study in this case has been directed to the spinal cord. In summary, our results are these: There are no evidences of tract disease. The occasional isolated degenerated fibres found in the posterior columns are probably ascending central branches of the degenerated spinal ganglion cells, though it seems that most of the ganglion cells affected must have been such as have their central fibre terminate in the gray matter of the cord. Were this not the case we certainly should have found something more in the nature of a systemic degeneration of the ascending tracts. The cytoplasmic degenerations of the ganglion cells of the spinal cord are rare and of such a character as might result from post-mortem changes or from the terminal infection which was the direct cause of death. The ganglion cell changes do not appear to us sufficient or of such character as might be expected were the process a secondary one following the long standing muscular atrophy; though it seems probable that secondary degenerations of these cells might eventually result as in amputation.

For lack of a better explanation we are inclined to account for the somewhat striking chromophylic changes in certain of the cells of the dorsal segments as due to nutritive disturbances particularly affecting this portion of the cord, following the extensive and rapidly progressing curvature of that portion of the spinal column.

The chief inference to be drawn from the negative findings of this case is that the spinal cord of a patient who had suffered for over fifteen years from a distinct form of progressive muscular dystrophy did not present any evidence tending to show that the wasting of the muscles could be attributed to disease of the gray or other matter of the spinal cord. Whoever wishes to maintain Erb's theory is, of course, at liberty to do so, but it should be regarded as pure speculation. For the present there seems to be sufficient warrant to maintain the distinction between the amyotrophies and the myopathies. It is difficult, however, to account for this latter group of family afflictions unless we are satisfied simply to state that there must in these cases be some defect in the embryonal structure which does not permit of a satisfactory development of the muscular system. That the disease represents a primary affection of the muscular fibre may be taken for granted, and that the fatty degeneration of the muscular fibre is secondary to the hypertrophy and atrophy of the muscular tissue.

There are two questions which it seems wise to raise for discussion:

First, are all these cases of progressive dystrophy primary diseases of the muscular system, and may not some of them be the local expression of a universal lipomatosis? Only recently one of us had occasion to examine a boy who presented all the clinical symptoms of a pseudohypertrophy; but with the development of the pseudohypertrophy there was also developed an enormous universal lipomatosis, so that it was difficult to state whether the boy's inability to use his limbs was due to this general accumulation of fat or to a purely muscular affection. This same boy presented other distinct stigmata of degeneration, such as defective mental development and a marked chronic hydrocephalus. The occurrence of stigmata of degeneration in so many of these cases of progressive muscular dystrophy would lead one to suspect that these diseases should be classified broadly among degenerative family disorders; and possibly we may reach a better understanding of these family afflictions if we depart from the purely anatomical lines and do not regard them merely as affections of the muscular or neural systems.

Secondly, the question arises whether these muscular dystrophies are necessarily progressive. Even though they may be predestined, as it were, to develop some form of progressive wasting of the muscles, is it not possible that the tendency to progressive deterioration of the muscular system may cease either spontaneously or may be checked by treatment directed to this end? A few rather noteworthy experiences which have been accumulated during the past seventeen years have led us to be more hopeful of the future of these cases, and in these experiences—few as they are—there is sufficient encouragement to urge that in every case of progressive muscular dystrophy the possibility of great improvement by systematic exercise should be kept in mind at the very start; and there is little doubt that if earnest efforts in this direction be made at an early period, better results may be obtained than has fallen to the lot of these unfortunate patients hitherto.

The most marked instance we have to record is that of a young woman, now twenty-five years of age, who first came under our notice at the age of ten and one-half years, in September, 1886, and whose condition was reported in the *Journal of Nervous and Mental Disease* and in the *New York Medical Journal* of 1888. The history taken at that time was briefly this:

The mother was forty-seven years of age, the father ten years older; the latter has since died of sarcoma. The patient was the youngest of all the children, and was born fourteen and a half years after the next oldest sister. During the first ten months of her life there was no trouble. The parents lived next to the Brooklyn Theatre at the time of the fire, and were compelled to take the child out in that cold December night. The parents lost all their worldly possessions at that time. The mother became greatly agitated, and, nursing the child at the time, she supposed that the trouble which was developed later on was naturally due to this sad occurrence. At first the child lost flesh, and was not able to stand until she was one and a half years old. She did well until the age of six, when the first difficulty in walking was noticed, and when the mother observed that the calves were growing larger; also, that both thighs were out of proportion to the rest of the body. At that time the faradic response was absolutely normal in all the muscles and nerves of the lower extremities. In January, 1887, it was noticed that the electrical condition remained normal, and that she had great difficulty in getting up and down from a chair or in rising from the floor. The flexors of the legs and thighs were particularly weak. In 1888 it was noted in addition that the calves and anterior thigh muscles were much hypertrophied; that the sternal portion of the cleidomastoid was distinctly atrophied; that the hand muscles were very thin; that she assumed the characteristic position in rising from the floor, presented a waddling gait, and that both feet were in valgus position; the arms seemed lean and long; all the muscles contracted properly to the faradic current, except the interossei of the hand and the vasti in the thighs.

The patient did not present herself again for the following eleven years, and since that time has remained continuously under observation. She had developed into womanhood and became a kindergarten teacher; and although she had experienced and still does experience some difficulty in going up and down stairs, and particularly in getting in and out of cars, she has been able to perform all her duties and is practically well, though much annoyed by the size of her hips and thighs, and the circumference of her waist. She attributes much of her well-being to the sytematic exercise which she has been carrying on for years, and to the calisthenic movements which her calling necessitates her doing with children every day of her life. At present she merely exhibits some slight weakness of the orbicularis of the right side and of the deep spinal muscles. If placed on the floor and asked to rise she climbs up upon herself in typical fashion. The grasp of her hands is weak, but aside from this and the difficulty in climbing, and the slight waddling gait, she has little to complain of. Her intellectual development is surely up to the average. The size of her limbs may be inferred from the following measurements: Right thigh, 69 cm.; left thigh, 63 cm.; right calf, 36 cm.; left calf, 36½ cm.; measurement around hips, 112 cm.; waist measurement, 71 cm. (twenty-eight inches). The strength of the limbs is not in proportion to the size of the muscles, and it is fair to assume that the muscles are still in a condition of hypertrophy. There is no unusual lipomatosis, for above the waist line she is thin rather than stout. There is still evidence of a weakness and atrophy of the muscles around the shoulder girdle, the pectoralis showing slight wasting. The young woman has been encouraged to keep up muscular exercise, but not beyond the point of easy fatigue, for it is evident that any excess in this direction would be followed by atrophy. According to present indications there is no reason why the girl should not continue in good health for many years to come; and whether or not there was a spontaneous cessation of the tendency to hypertrophy and atrophy, the case has run an exceptionally favorable course, and as such is worth recording.

The second case was one which Dr. Wiener reported a number of years ago from my (Sachs') clinic.[1]

This case was exhibited before this Society some years ago. A few points of the history worth noting are that the patient at the time of the first examination, in 1893, was twenty-three years of age. Since May, 1892, he had been complaining of pains following upon active exercise; had experienced special difficulty in walking up and down stairs. The weakness of the muscles was first evidenced in the legs, then in the back, then in the hips, and, finally, in the shoulders and neck. The examination revealed marked atrophy of the muscles of the shoulders, back, hips, and thighs, as well as of the facial muscles. There was marked lordosis in the lower dorsal and upper lumbar region, He had loose shoulders and the typical gait of pseudohypertrophy. A microscopical examination of a piece of muscle removed from the deltoid revealed atrophic fibres and a proliferation of the muscle nuclei; also, some cellular infiltration in the interstitial tissue. By means of systematic gymnastic exercises, which Dr. Wiener directed, a marked improvement was brought about in the patient, so that he was able to go about his occupation, and, as I understand, has become a very expert bicycle rider. In Dr. Wiener's article a special note was made that the only muscles which did not improve were those of the face, and these had not been subjected to special exercise.

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[1] Neurologisches Centralblatt, 1896, No. 9.

In clinical and private practice during the past few years other cases of pseudohypertrophy have been examined. and each and every one of them has been subjected to systematic exercise; and while it is still too early to report definitely upon them, it is at least safe to infer that the progressive deterioration of the muscular system can be checked, for a time at any rate, by active exercise. After all, the life of every part of the system is maintained by compelling it to perform, as far as possible, its natural physiological function. There is some reason to think that by this simple method much can be accomplished in the progressive myopathies. At all events, it would be a satisfaction to feel that a small number of the patients afflicted with progressive muscular disease may be rescued from the sad fate that awaits so many of them.

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THE MALARIA OF THE TROPICS.

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In the light of our recent knowledge of the subject, malaria may be defined as a specific infectious fever, characterized symptomatically by the following stages: Rigor, hyperpyrexia, and diaphoresis, occurring periodically; pathologically by certain changes in the elements composing the blood, and invariably by the presence in the blood of the plasmodium of Laveran; changes in the internal organs, and in the bone marrow.

Etiology. The predisposing causes are tropical climates, summer seasons, low marsh lands, dampness, decaying vegetable matter, and the prevalence of a certain species of mosquito—the Anopheles claviger.[1]

The exciting cause is the plasmodium of Laveran, which gains admission into the blood by the bite of the mosquito.

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[1] It is probable that several other species of mosquito act as the intermediate host.

Pathology. The blood. In almost all cases of the disease, and invariably in those of long standing, and particularly in those presenting the more grave clinical pictures, we find the total bulk of the blood more or less reduced.

The red corpuscles are always reduced in number; in the milder cases, produced by the benign parasites, the reduction averages from 5 to 8 per cent.; this reduction in the number of red cells is progressive, both with the number of attacks and with the severity of the disease; for instance, in some of the pernicious cases we find that they do not average more than a million to the c.mm., and are frequently less than this.

The hæmoglobin is also reduced to a marked degree, usually out of all proportion to the loss in the number of red cells, the reduction ranging from 10 or 20 to 50 per cent. (Manson), the red corpuscles not attacked by the parasite being quite pale in color.

The shape and size of the red cells attacked by the parasite depends upon the type of the invading parasite. In the case of the benign quartan the red corpuscle retains its shape and size; in that of the benign tertian the red cell is enlarged; it is only in the blood of those patients suffering from a malignant type of the disease that we find the small, crenated, warped, and distorted red corpuscles known as the "brassy body."

In the malignant cases the white cells are frequently increased, and in some types of the disease markedly so.

Free pigment floating in the blood plasma can frequently be found, but it is usually observed within a leucocyte or a dead parasite. The amount of pigment depends upon the type and severity of the attack. In advanced cases of malignant malaria it is always quite abundant.

The Internal Organs. The spleen. This organ is always enlarged, frequently reaching an enormous size. It is more or less pigmented, and in cases of long standing may be almost black in color. Its glandular structure is usually found to have undergone fatty degeneration, and its bloodvessels are filled with débris of broken-down cells, plasmodiæ, and pigment.

The liver is usually more or less enlarged, congested, and pigmented.

The lungs are frequently pigmented, and the heart in cases of long standing usually presents more or less evidence of fatty degeneration.

The substance of the brain is usually of a leaden hue, and its vessels are frequently filled with pigment and numerous parasites. The small vessels are sometimes the seat of parasitical emboli.

The bone marrow of the spongy bones is congested and degenerated, and is frequently heavily pigmented.

CLINICAL CLASSIFICATION OF MALARIAL FEVERS.

Intermittent. Remittent.

- Benign
  - Quartan.
  - Tertian.
- Malignant
  - Quotidian.
  - Tertian.
- Pernicious.
  - Cerebral.
  - Algid.
- Malarial Cachexia.

The tendency in all malarial infection is for the fever to intermit, and it is only through accident that we meet with cases which remit. The manner in which this occurs is as follows: Instead of the quartan, tertian, or quotidian parasites in a selected case maturing simultaneously numbers of them mature and sporulate before their brothers, thus giving rise to various typical cases of a remittent character.

But because we see so many cases of remittent malaria clinically, especially in tropical countries, it has been deemed wise to adhere to the name in this classification.

Malaria classified according to an examination of the blood would be arranged somewhat differently, viz., according to the species of the plasmodium producing a typical phase of the disease. Dr. Manson's classification with reference to the blood examination is as follows:

- Benign
  - Quartan
  - Tertian
  - Do not form crescents.
- Malignant
  - Quotidian-pigmented
  - Quotidian-unpigmented
  - Tertian . . . . . .
  - Form crescents.

Intermittent Type.

Premonitory Stage. It frequently happens that for a day or two prior to a malarial attack the patient will complain of malaise, headache, vague muscular pain, anorexia, and constipation. These symptoms are suddenly superseded by the

Stage of rigor, which is ushered in by a more or less severe chill. The features become blue and pinched, the teeth chatter, and the patient complains of extreme cold, and asks for all the covering he can obtain. Vomiting is frequently a severe and very distressing symptom. If the temperature is taken it will be found to be several degrees above normal. This stage lasts about an hour, when it is followed by the

Stage of hyperpyrexia, in which the temperature suddenly rises to 104° or 105°, sometimes reaching 106° or even more. The patient's face is now flushed, the eyes injected, the pulse full, rapid, and bounding. The skin is dry and hot, headache is severe, and vomiting frequent. These symptoms continue from three to four hours, and are in turn superseded by those of the

Stage of diaphoresis, in which the patient is in a profuse, drenching perspiration. The temperature now rapidly subsides, and all other symptoms gradually disappear. In a few hours, except for a feeling of lassitude, the patient is apparently well. The temperature will probably be subnormal. This afebrile period lasts from twenty-four to forty-eight or seventy-two hours, depending upon the type of parasite productive of the symptoms, when, if not treated, they usually reappear, although spontaneous recovery sometimes occurs. This periodical return of the symptoms may continue for some time, and if the parasite is not removed from the blood some atypical form of the disease may ensue.

Diagnosis. The presence of the plasmodium of Laveran in the blood will prevent mistakes in diagnosis.

Prognosis. Favorable as to the duration of the attack.

Treatment. Rest in bed upon a liquid diet, 30 grammes of magnesium sulphate given at once, then, as Manson advises, wait for the appearance of sweating, when 0.648 grammes of quinine should be administered. During the next twelve hours 1.324 grammes of the drug should be given. Upon the three succeeding days 2 grammes of the drug should be used, when, if no recurrence of the disease occurs, the dose should be cut down to 0.324 grammes t. i. d., and continued over a period of five or six days.

The Remittent Phase.

This form of malarial infection is not typical of the disease, but its frequent clinical occurrence makes a general description necessary.

The manner in which it is produced has already been described, so it can readily be understood that an infection produced by any one of the five malarial parasites may result in an atypical case, in which the fever will be remittent in character.

It may begin as a pure intermittent, and gradually become remittent. This usually occurs in cases of benign infection, or it may remit from the start, which is frequently observed in cases of malignant infection.

With the exception of the character of the fever, the symptoms, on the whole, to a considerable degree, resemble those observed in cases of the intermittent type, but are not so pronounced, the three stages of cold, heat, and free sweating not being so readily separated, or they may be altogether absent, or which would be more true not recognizable, the patient simply complaining of feeling somewhat worse at a certain period of the twenty-four hours, and it is this periodicity so characteristic of malarial infection which must be looked for if mistakes in diagnosis are to be avoided.

The tendency in all cases of remittent infection is for the disease to be prolonged; especially is this true where the infecting parasite is malignant in character.

Diagnosis. To avoid error a blood examination should be made as soon as possible.

Prognosis. This is not nearly so favorable as in the cases of intermittent type.

Treatment. Rest in bed and a liquid diet. The administration of a brisk saline purge and the early and immediate use of quinine in large doses.

Commence with one gramme and follow this in the succeeding twenty-four hours by three grammes; then continue to give 2.6 gramme a day until the patient is thoroughly cinchonized, after which the dose may gradually be reduced, and finally discontinued, depending upon the microscopical examination of the blood.

After prolonged treatment, should the organism persist in the blood, arsenic should be pushed to its physiological limit, at the same time administering iron in the shape of tr. ferri chlor.

Should the organism still persist, a change of climate should be advised.

Malignant Types.

Although the fever associated with malignant malarial infection is usually remittent in character, still we do see well-marked cases of typical quotidian or tertian intermittent, but they are comparatively rare and usually sooner or later assume the characteristics of the remittent phase of the disease.

The malignant cases differ clinically from the benign, in that they are usually of longer duration, relapses are frequent, at intervals of from ten to fifteen days they show a decided tendency to develop cachectic symptoms, and in addition to the more pronounced headache, anorexia, loss of flesh and energy, the patient complains of neuralgic pains in different parts of the body, great mental depression, the skin and scleræ are stained a deep yellow, pigmented patches appear upon the body, hemorrhages occur from the mucous membranes and beneath the skin, the latter frequently giving rise to well-marked purpuric conditions.

During the later stages of the disease the heart becomes weak, rapid, and irregular, in some cases tachycardia being very pronounced.

The bowels may be constipated, or a bilious diarrhœa may be associated with the other clinical features.

It is in these cases that pernicious symptoms suddenly develop, producing death in a few hours, or, at times, leaving the patient a paralytic invalid, or, less frequently, partially or totally blind.

The prognosis is very unfavorable if the patient cannot obtain change of climate, and then many of them remain permanent invalids.

The treatment embraces climatic, hygienic, and medicinal features. Medically the treatment should follow the lines already considered under the treatment of the remittent phase of the disease. In severe cases, or those which persist after prolonged and careful treatment, a change of climate should be advised; a dry, moderately cold, sunny locality should be selected if possible. The patient's clothing should be at all times warm, as any sudden chilling will be productive of bad results.

Pernicious Attacks.

These may occur during any case of malarial infection, but are more apt to be associated with the malignant cases. They may be divided into two classes, viz., cerebral and algid.

The cerebral attacks are more or less varied in character, the most common seizure being one associated with hyperpyrexia and coma, the temperature suddenly jumping up to 108° or 110° or even 112°; or with a temperature of 104° coma suddenly develops, which may disappear with the appearance of sweating, or the patient may die of exhaustion.

The attack may result in permanent paralysis, and in some cases a temporary or permanent blindness may ensue.

The algid attacks are associated with greatly lowered surface temperature, shock, and collapse. They may be accompanied by gastric symptoms, persistent vomiting, with gastric pain and distress, or they may be of intestinal type, sometimes closely resembling cholera, or, in other cases, there may be the bloody mucous stool of dysentery, all these conditions tending to end in fatal syncope.

The cerebral cases with high fever should be treated with ice baths or an ice pack, and about six grammes of quinine should be administered as quickly as possible, two grammes being given by the mouth, two by the rectum, and two hypodermically.

The algid forms require in addition to quinine active stimulation, and should be kept absolutely quiet, as the least exertion may induce fatal syncope.

Hæmoglobinuric Fever (Black-water Fever).

This form of malarial infection, first observed and reported by French naval surgeons serving on the African station, and since observed in America, some parts of India, and Southern China, seems not to exist in the Philippines, or at least if cases have been met with they have not been reported.

This is an exceedingly fatal variety of infection. According to Manson, one out of every three or four cases ending in death, and those cases in which recovery takes place remain intensely anæmic and frequently develop seriously diseased kidneys. It usually occurs in patients who have had several prior attacks of intermittent or remittent fever, the disease generally beginning in much the same way. After a short time the patient complains of pain in the loins and over the region of the liver, which soon becomes severe.

Gastric symptoms are usually pronounced, incessant vomiting and great pain are frequently encountered. The bowels are usually constipated, but bilious diarrhœa is sometimes a marked symptom. The skin and scleræ are always stained a deep yellow. The urine becomes very dark, the coloring gradually growing more pronounced until it is almost black. The fever may be intermittent in character, occurring periodically every twenty-four, forty-eight, or seventy-two hours, or it may assume a remittent character or become irregular.

As the disease advances pernicious symptoms may arise at any time. They may be either cerebral or algid in form, death ensuing in a few hours; or the disease may take a favorable turn, the symptoms gradually disappearing, the urine slowly regaining its normal color, and the patient emerging from the attack in an intensely anæmic condition.

The urine should be carefully examined from time to time, as death from acute Bright's disease frequently occurs three or four weeks after all symptoms of the original disease have disappeared, or the kidneys may become the seat of chronic parenchymatous or interstitial nephritis.

Prognosis. Very unfavorable.

Treatment. Absolute rest in bed, and if possible an absolute milk diet should be insisted upon.

If the microscope should reveal the malarial parasite in the blood the treatment should be that previously mentioned in connection with remittent fever.

If constipated, 0.324 grammes or 0.648 grammes of calomel should be given, followed by 30 grammes of magnesium sulphate.

Upon the first sign of kidney insufficiency, diuretics should be freely administered, and hot flaxseed poultices applied to the loins. Should suppression with uræmic symptoms intervene, pilocarpine should be given hypodermically, and the patient placed in a hot pack.

Special Remittent Fevers.

Bilious Remittent. This fever is frequently met with in malarious localities, the characteristic fever being associated with marked gastric symptoms, sometimes the bowels are constipated, but more frequently bilious diarrhœa is present.

Remittent fever is frequently associated with typhoidal symptoms, a low muttering delirium with great prostration being observed.

These fevers, in addition to the usual malarial treatment, require special attention given their respective symptoms.

Malarial Cachexia.

A chronic condition resulting from severe or repeated malarial infection, characterized by pronounced anæmia with its associated symptoms, and usually by an intense yellow staining of the skin.

The patient is emaciated, the skin usually of a deep yellow hue.

Great muscular weakness is a pronounced symptom. Gastric distress in the shape of various dyspeptic conditions is common. The heart is weak and rapid, sometimes giving rise to a pronounced tachycardia, the least exertion resulting in varying degrees of dyspnœa.

Peripheral multiple neuritis is frequently met with, the superficial reflexes diminished or even abolished.

Headache and neuralgia, occurring periodically, are almost constant symptoms.

Mental depression, sometimes verging on melancholia, is frequently present.

Hemorrhages from the mucous membranes, and beneath the skin, with varying degrees of purpura are seen.

Inflammation of the spleen and liver, with their associated symptoms, are common. In the case of the former enormous enlargements of that organ are frequently observed.

Microscopical examination of the blood will reveal anæmia, varying from a slight reduction of the red cells, to a condition of the blood closely resembling that of pernicious anæmia; or the white cells may be increased, giving rise to pronounced leucocytosis.

This condition renders the patient particularly liable to the contraction of many serious and fatal diseases, such as pulmonary tuberculosis, catarrhal pneumonia, typhoid fever, and dysentery, and to the development of chronic disease of the kidneys and fatty degeneration of the heart.

A change of climate should be advised. The patient should be warmly clad, and the diet should be nutritious and stimulating. A methodical superfeeding should be carried out.

The medical treatment should consist in administration of such drugs as arsenic, iron, quinine, and strychnine.

REVIEWS.

A Practical Treatise on Genito-urinary and Venereal Diseases and Syphilis. By Robert W. Taylor, A.M., M.D., Clinical Professor of Venereal Diseases at the College of Physicians and Surgeons (Columbia University), New York; Surgeon to Bellevue Hospital, and Consulting Surgeon to City (Charity) Hospital, New York. Second edition. One volume. Pp. 722, with 138 illustrations and 27 plates, in colors and monochrome. Philadelphia and New York: Lea Brothers & Co., 1900.

The profession has for years regarded Dr. Taylor as a leader in this subject, and has learned to trust in the matureness of his judgment and the wisdom of his advice. It is, therefore, with pleasure that we open this new volume, knowing that the contents will have the touch of the master's hand. The previous edition appeared in 1895, consisted of a thousand pages, and was justly considered a standard for books on that subject. In the preface of the present volume the author states that he has endeavored to present an up-to-date, practical, and compact treatise. As a result this volume is nearly one-third smaller than the last, and several subjects are treated so briefly and concisely as to be of little service to any except the genito-urinary expert; and yet with all the brevity the writer's views are summed up clearly in a few well-chosen words, and we are forced to believe that an extended consideration of surgical diseases of the kidneys, bladder, and prostate seemed to him out of place in a book of this character. Aside from this there is very much to praise in the work. The description of gonorrhœa and its treatment is excellent, and his forcible remarks on facts are timely and just. He believes that gonorrhœa in 80 or 90 per cent. of cases invades the whole urethra, and that only exceptionally is it limited to the anterior portion. Such a statement is undoubtedly true of dispensary cases, where the poor are unwilling or too ignorant to properly follow the treatment recommended, but when applied to private practice we would feel chagrined if posterior urethritis so often supervened. Under gonorrhœal rheumatism he states as a golden rule that the inflammation in the urethra must be cured, since it is the source and origin of the disease. If the hydroarthrosis in this complication does not speedily subside after the application of blisters, he advocates aspiration and irrigation of the joint. It is to be hoped that this teaching will have many disciples. His remarks on prostatic hypertrophy are excellent, and a clear conception is given when palliative treatment should cease and operative treatment begin. In hydrocele he prefers Von Bergmann's operation of resection of the sac, but does not mention Doyen's procedure, which accomplishes the same results in perhaps an easier and quicker manner.

The book closes with a series of chapters on syphilis, which are classical. Great emphasis is laid on the fact that the proper time to begin systematic medication in syphilis is the date at which general manifestations show themselves—namely, as soon as the generalized rash appears together with the manifold symptoms of the secondary period. Few exceptions to this rule present themselves. The various forms of treatment are clearly detailed, and concise instructions given on the course to be pursued.

The book is singularly free from pages of prescriptions, a fault so common in works of this character. In all matters relating to treatment, both surgical and medical, the author has aimed at presenting wholesome, conservative, and practical directions, and to accomplish this in such a condensed form as the present volume shows a high order of ability and labor. We can unhesitatingly recommend this book to both students and practitioners. R. G. LC.

A PRACTICAL TREATISE ON SEXUAL DISORDERS OF THE MALE AND FEMALE. By ROBERT W. TAYLOR, A.M., M.D., Clinical Professor of Venereal Diseases at the College of Physicians and Surgeons (Columbia University), New York; Surgeon to Bellevue Hospital, and Consulting Surgeon to the City (Charity) Hospital, New York. Second edition. One volume. Pp. 438, with 91 illustrations and 13 plates, in colors and monochrome. Philadelphia and New York: Lea Brothers & Co.

THE appearance of a second edition of Dr. Taylor's book on this subject is good evidence that the first edition was well received by the profession, and satisfactorily filled a needed want. The book is a little larger than its predecessor, but still of a very convenient size. The text has been thoroughly revised, the black and white illustrations and also the colored plates are of high order, and freely illustrate the subject in hand. The chapters on the anatomy and physiology of the sexual apparatus have been much amplified, and the subject of sexual disorders in women is presented in a more comprehensive manner. Particular attention has been paid to the therapeutics, in the direction of clearness of statement and of practicability. Until recently the subject of sexual disorders has been treated in a rather loose and impractical manner, the work done being unsatisfactory and unscientific when viewed as a whole, and based to a certain extent on visionary theories. It has been Dr. Taylor's province to gather together the useful information that has been gained, and separate facts from fancies. As a result, we have a well-balanced volume on this highly important system. The underlying anatomical and physiological conditions have never been lost sight of in his description of diseases and symptoms, and the light of pathology has been thrown on the picture as fully as our present knowledge will warrant. The broad lines laid down by Dr. Taylor permit us to grasp comprehensively, on scientific and practical grounds, diseases which a few years ago were vaguely if at all understood, and as a result our treatment of such disorders is steadily progressing to a satisfactory basis.

The general practitioner is apt to have but few cases of these disorders, and his knowledge on the subject is usually correspondingly limited. Should he have occasion for such knowledge we can highly recommend to him Dr. Taylor's work. R. G. LC.

THE AMERICAN YEAR-BOOK OF MEDICINE AND SURGERY. Being a yearly digest of scientific progress and authoritative opinion in all branches of medicine and surgery, drawn from journals, monographs, and text-books of the leading American and foreign authors and investigators, collected and arranged with critical editorial comments, under the general editorial charge of GEORGE M. GOULD, M.D. In two volumes. Vol. I., Medicine. Vol. II., Surgery. Philadelphia and London: W. B. Saunders & Co., 1901.

DR. GOULD has adhered to the plan adopted last year of issuing this book in two volumes, one on medicine and the other devoted to surgical subjects. The volume on medicine is somewhat larger than that on surgery. The two volumes represent a very complete library of abstracts from current medical literature. These abstracts are wisely chosen, and the original matter has been carefully abstracted, the result being the production of a compend of modern medical literature in such shape as to be readily got at by those in pursuit of the literature of any particular subject. In the volume on surgery we would call particular attention to the section on general surgery. The subject is, of course, a large one, and we think that the method employed by the editors in the extraction of material of value from such a large field has resulted in a particularly useful epitome of the year's literature on the subject. In the volume on medicine the most notable sections are those on general medicine, by Drs. Stengel and Edsall, and on pathology and bacteriology, by Drs. Riesman and Kelly. In no branch of medicine have such extraordinarily important acquisitions to our knowledge been made as in pathology and bacteriology, and as upon these studies all clinical medicine must rest for its foundation, it is a great advantage for the busy practitioner to be able in a work of this character to find a condensation of the literature of the laboratory, with which it would otherwise be impossible for him to keep up; thus, in the study of yellow fever, cancer and malaria, accessions to our knowledge are made daily, possessing the greatest importance in the treatment of those conditions. Here the many articles which have been published during the past year by various laboratory workers are digested and the authoritative results indicated.

The handsome typography and make-up of the books are particularly to be commended. F. R. P.

THE MEDICAL NEWS POCKET FORMULARY. Containing 1700 prescriptions representing the latest and most approved methods of administering remedial agents. By E. QUIN THORNTON, M.D., Demonstrator of Therapeutics, Pharmacy, and Materia Medica in the Jefferson Medical College, Philadelphia. New (third) edition. Carefully revised to date of issue. In one wallet-shaped volume, strongly bound in leather, with pocket and pencil. Philadelphia and New York: Lea Brothers & Co., 1901.

WHILE the pocket formulary is in general a useful addition to the physicians' library, it of necessity has its limitation and dangers. For, after all, the practitioner of medicine must suit his combinations and doses to the individual case, and the tendency of a formulary is to encourage wholesale copying of prescriptions without a due study of original causes. On the other hand, when the formulary is used as it should be, merely as a suggestion and help toward compounding the prescription, it is of great value, for often a physician may forget temporarily an appropriate drug or a happy combination, both of which may be supplied at short notice from the experiences of other men, most of them eminent in their different branches of the profession. The *Medical News Formulary* is one of the best that has appeared. It contains over seventeen hundred formulæ relating to the treatment of all diseases that the physician will encounter, and they are arranged in alphabetical order under the headings of the various diseases treated upon. And not only is the formula given alone, as is too often the case in such works, but there is appended to each a short note giving directions as to the administration of the remedy, the suitable diet for the case, and the indications calling for this particular line of treatment. Under each heading there are a number of different prescriptions, either for different phases of the same disease, or the treatments of different men. Care has been used to exhibit the drugs in a palatable form, and most of the remedies suggested are those whose action is well known and not fancy or untried preparations. In addition, there are tables of weights and measures, incompatibles, poisons and antidotes, and of dosage which are handy for ready reference. The volume is neatly bound in soft leather and of a convenient size to carry in the pocket; the text is clear and well printed on good paper. This little work has had a great deal of popularity in the past, as is evidenced by the rapid exhaustion of the two preceding editions, and as a number of new drugs and different combinations of old ones have been included in the present (third edition), it will undoubtedly be as much appreciated as the others. G. M. C.

OBSTETRIC AND GYNECOLOGIC NURSING. By E. P. DAVIS, A.M., M.D., Professor of Obstetrics in Jefferson Medical College, and of Obstetrics and Diseases of Infants in the Philadelphia Polyclinic. 12mo., 402 pages. Illustrated. Philadelphia and London: W. B. Saunders & Co., 1901.

THIS volume has been prepared as a text-book for obstetrical and gynecological nurses, and is dedicated to the training schools of the Jefferson and Philadelphia Hospitals. The teaching is clear and concise, at the same time conservative, and the style is excellent. Much stress is laid upon the importance of antisepsis and cleanliness in every duty which the nurse is called upon to perform, and the relations which should exist between the nurse and the patient and the nurse and the physician are clearly brought out. We are particularly pleased to note this advice to the obstetrical nurse: "If the physician requests her to tell him whether a laceration is present or not, she should respectfully decline, saying that she is not competent to make the examination." The book is well illustrated and is divided into two parts, the first being devoted to obstetrical and the second to gynecological nursing. The author's definition of gynecological nursing is open to question and will not be generally admitted: "This branch of nursing has to do with those conditions of ill health in women in which the pelvic organs are concerned, but in which disease does not arise from pregnancy, parturition, or the puerperal state. As the majority of diseases among women are connected with pregnancy or parturition, it will be seen that the field of gynecological nursing is a narrow one. As much of the treatment employed is of a surgical nature, it is more a surgical specialty than a separate and distinct department of medicine."

As a rule, the trained gynecologist is better qualified than the obstetrician, both by experience and skill, to perform the secondary plastic operations and the abdominal operations necessitated by abortion and the accidents of pregnancy, and the gynecological nurse must be thoroughly trained for this work. She is also frequently called upon by the gynecologist to nurse patients who do not require surgical measures, and whose disorders are not due to disturbances incident to puberty, menstruation, and the menopause.

Careful and clear instruction is given for the care of the infant and the disorders which may arise. The appendix contains dietary formulæ and methods for the preparation of surgical supplies. J. B. S.

CLINICAL STUDIES IN VICE AND IN INSANITY. BY GEORGE R. WILSON, M.D., Medical Superintendent, Mavisbank Asylum. Pp. 234. New York: MacMillan Company. Edinburgh: William F. Clay, 1899.

THE author divides his book into three parts, viz.: "1. Drunkenness and alcoholism considered as always a morbid affection of the purposive or self-directive functions of the mind, with special reference to the dynamics of *cerebral* processes."

"2. Types of alcoholists—twelve cases, some of them peculiar, considered especially from the point of view of the question, What kind of men and women become drunkards?"

"3. A clinical study of insanity from records of fifteen cases, with various digressions—the mental physician's point of view."

Writers have endeavored to make a distinction "between drunkenness, inebriety, alcoholism, dipsomania, mania a potu, delirium tremens, alcoholic insanity, alcoholic epilepsy, as if each were a disease by itself." These terms are often convenient, but the author makes an appeal for a recognition of the fact that all of these disordered conditions have a definite and fairly constant lesion running through them, the difference depending mainly "in the part of the nervous system or organ affected, the localization or diffusion of the lesion, the acuteness or intensity of it, and its complications," and suggests that a generic term as "alcoholism" should be used. Dr. Anstie has defined alcoholism to be "a disease of the general nervous system, induced by continued excesses in the use of alcoholic liquors." Victor Magnan and others have made contributions to the literature of alcoholism, not from the stand-point of the moralist, but founded upon the clinical experience of physicians. The term has come to have a medical significance, and the conditions described have a tangible recognition. A nomenclature or classification is always helpful if generally understood and accepted, and the author, at the risk of a new venture in this direction, would use a descriptive adjective, as simple or chronic alcoholism; epileptic alcoholism; alcoholic insanity; delusional alcoholism, etc. As many of the morbid manifestations, both mental and physical, that belong to the excessive use of alcohol are also observed from the prolonged use of drugs, and we might add the abuse of drugs, it would seem there is a warrant for a supplemental nomenclature, so as to include cases of this character.

Admitting the difficulty which attends a study of the physiology of mind from a knowledge of the anatomy of the brain and of understanding the relation of symptoms of disease to pathological conditions, the author proceeds to present " a dynamical view of brain physiology," or the operation of nerve motion upon the dendritic portion of the brain, and attempts to lay a foundation of the pathology of drunkenness. It is not alleged that these views are founded upon clinical observations; and whether they are to be numbered among the many instances of indulgence in fruitless theoretical speculations about this subject, time and further consideration will show.

That prolonged indulgence in alcoholic dissipation results in pathological changes in the brain has been shown by Dr. H. J. Berkely and others. Although the connection between these abnormal conditions and the various nervous and mental manifestations that follow is not yet understood, they are sufficiently related to establish the existence of disease and to bring these cases within the domain of medical science and study. The author might have laid a stronger foundation for the title of his book if he had furnished a history of the published cases prior to the manifestation of pathological or mental changes. It will appear, as a rule, that the majority of cases of alcoholism give some indications of degeneration to a lower plane, which is one of the results of heredity, and some of the cases cited establish this fact. A lowered moral sense and absence of will-power are the usual accompaniments of vicious propensities, so that bad habits acquired by doing a thing over and over again are no longer resisted, and become easily fixed. Vicious habits may become by repetition as firmly established as those of decent living, so that the moral aspect of these cases cannot be wholly ignored in the diagnosis or in the after-management.

There will be a general agreement with all that the author proposes as to the means and importance of re-establishing the general health of alcoholics; but he omits the most important element of treatment, which is the power of detention of the patient, in the absence of which all efforts are futile. How this is to be exercised, or under what conditions it will be granted, cannot be discussed here. If given, it will be against the judgment of public officials; of lawyers who will look upon this step as a move to abolish a sacred privilege of the citizen, and if ever granted will be done grudgingly, and only after it has been demonstrated by medical experience to be an essential to successful treatment. There is no problem in morals, sociology, or in medicine which has been approached or considered in such a cowardly manner as the relation of the drink habit, vice and vicious habits to insanity. It becomes the medical and legal professions and all boards having to do with the incompetent classes in their various relations to give the various questions that are involved their fair and best consideration.

The number of applications made by alcoholics for admission to hospitals intended for the care of the insane, to sanitariums and so-called "cures," often under the management of charlatans, is an evidence of their desire, as well as the victims of all habits, for relief. As a contribution from the large clinical experience of Dr. Wilson we welcome this book and all efforts to place the study of alcoholics and habit cases on a higher medical plane.

The cases of insanity reported have a value as showing the relation of vice and vicious habits to the production of this disease. It may be noted, also, that many of them bear indications of transmitted predisposition to depravity and disease, and to a degree illustrate what is often observed—that vice, crime, and alcohol are among the most prolific indirect causes of insanity. J. B. C.

ANATOMY IN ITS RELATION TO ART. An Exposition of the Bones and Muscles of the Human Body, with Especial Reference to their Influence upon its Actions and External Form. By GEORGE McCLELLAN, M.D., author of "Regional Anatomy," etc. Illustrated by 338 original drawings and photographs made by the author expressly for the work. Published by the author, 1900.

DR. McCLELLAN has again written and himself published a most sumptuous work on human anatomy. The scope of the present work is confined to the relationship of anatomy to art—a subject in which this acknowledged master of the science of human construction is peculiarly fitted to speak with authority and to present it with all the added force of delicate artistic appreciation, he himself being skilful in the arts of drawing and photography and familiar with the needs of an artist from many years of experience as a teacher of anatomy at the Pennsylvania Academy of the Fine Arts. The result, as embodied in this large quarto, fully justifies the expectation of his many appreciative pupils and friends in the medical profession. They would expect much from so competent a teacher, not only in technical completeness, but original presentation, and the product will sustain all tests.

The special features of the work are the studies of the skeleton in relation to the outline of the body and to the photograph of the model, care being exercised to secure (by great labor and trouble) skeletons and models which shall exactly correspond and be as nearly as possible perfect in proportions.

Next the individual parts of the bony framework are studied, and the distinctly original plan is pursued of sketching in the deepest muscles first, then in increasing series the other muscles, until the completed part is presented as a photograph of the model. This is different from the older books, since elsewhere the plan is followed of dissecting away the skin and gradually reaching the deeper structures. In the method employed by Dr. McClellan a clearer idea is secured of the relationships of the bones to the muscles, and also the method of reproduction used displays these parts in a diagrammatic fashion, giving the directions of the tendinous and ligamentous structures, but presenting most beautifully a quality of transparency to the limb or part analogous to an idealized fluoroscopic view.

Another striking feature of this book, also distinctly original, is the systematic comparison, side by side, of certain of the best specimens of antique statuary and photographs of the living model. In this connection Dr. McClellan makes a great point of calling the attention of artists to the importance of holding constantly in mind that this work has to do with living anatomy in normal poise and not with crude dissections of the dead as they are tempted to do. Much of modern statuary exhibits this fault, and the consequence is an appearance of exaggeration and overtension marring grace and finish.

This is particularly well shown in the plates of the "Sandal Binder," the "Discobolus Thrower," the "Flying" and the "Resting Mercury," and the "Fighting Gladiator."

Photographs of the female figure are also shown in a number of customary and domestic poses, which bring out the beauty of outline in contrast to the skeleton in simple and reposeful attitudes. These, again, contrast charmingly and usefully with the male poses.

Some of the most valuable and original features of the book are Dr. McClellan's researches on the proportions of the human figure. He has taken pains to compare the observations of Vitruvius and others and verify them where they are warranted and to offer his own conclusions. This has involved a very large amount of study and labor, which forms an invaluable chapter at the close of the book and offers practical suggestions which will prove useful to the student of human proportion.

The construction of the book itself is unusually handsome, the text being printed in a dark gray and the plates upon a specially prepared paper, also in light tints and in a rich, warm gray, giving a delicacy to the proportions.

The depths and qualities of the photographs, too, are preserved to an unusual degree in reproduction. J. M. T.

MODERN SURGERY: GENERAL AND OPERATIVE. By JOHN CHALMERS DA COSTA, M.D., Professor of the Principles of Surgery and of Clinical Surgery, Jefferson Medical College, Philadelphia; Surgeon to the Philadelphia Hospital and to St. Joseph's Hospital, Philadelphia. With 493 illustrations. Third edition, revised and enlarged. Philadelphia and London: W. B. Saunders & Co., 1900.

THE appearance of this the third edition only two years after the second shows that the verdict of the profession has been favorable to the work.

It is not simply a reprint of previous editions, but the whole work has been most thoroughly revised. Each separate chapter seems to have been gone over and alterations and additions made. The total increase amounts to two hundred and six pages of new material, distributed pretty evenly throughout the volume. This, of course, brings the work well up to date and adds much to its previous value. The original aim, as stated by the author, was to present in clear terms fundamental principles, the chief operations, and the accepted methods of modern surgery, and to do this in a work which would stand between the complete but cumbrous text-books and the incomplete but concentrated compends. He was successful in accomplishing his purpose in the previous editions, and he has not departed from the lines then laid down in this edition. Subsequent issues, however, will demand pruning down if additional new matter is inserted. The work as it stands is an exceedingly useful one, both to the student and practitioner. The former is not confused with numberless details, while the latter will find in it almost everything he seeks for. The descriptions, while necessarily brief, still contain the essential points, together with many suggestions and hints that will be found of value. The work is very practical in character, and, while the most advanced procedures are referred to, a judicious conservatism has been exercised in those recommended, thus rendering it a safe guide for practice. G. G. D.

ORTHOPEDIC SURGERY. A HAND-BOOK. BY CHARLES BELL KEETLEY, F.R.C.S., Surgeon to the West London Hospital, etc. London: Smith, Elder & Co., 1900.

THIS is a medium-sized volume of 539 pages and 253 illustrations. The author states that the work was planned out nearly twenty years ago, and he publishes it as a statement of the views and as an analysis of the observations of a surgeon who has for twenty-two years devoted much time, thought, and labor to studying deformities and practising their treatment. Tuberculous diseases of the bones and joints, with the exception of spinal caries, are omitted, as are also ankyloses. They are reserved for appearance at a subsequent date in the form of an essay on the pathology and treatment of diseased and injured joints.

The book will be found to appeal both to the general practitioner who wishes to inform himself on the subject of orthopedics as well as to the specialist. It embraces chapters on knock-knees, bow-legs, rickets, various paralyses, cerebral and spinal; flat-foot, club-foot, hysteria in relation to orthopedics, wry-neck, deformities of the hands, fingers, and toes; congenital dislocations of the hip; the various diseases and deformities of the spine, acromegaly and a detailed description of the application and management of plaster-of-Paris and poroplastic felt. It is written in an excellent style. The descriptions and explanations are concise, clear, and readily understood. There is an absence of verbosity, involvement of sentences, and prolixity that will commend it to the busy man. At the commencement of each chapter is a synopsis of its contents, a half to three-quarters of a page being consumed. This could be condensed with advantage. The book is not a compilation of other people's work, neither is it a bold statement of the opinions of the writer. Contemporary literature has been studied and new procedures are explained and the author's views given as to their value. We judge that it is a fair presentation of modern British orthopedic surgery. It is a safe guide to follow. Unproven theories are eschewed, and the treatment advised is based on the more accepted pathological teachings. This practical treatment of the subject makes the book particularly vâluable to the general practitioner. The specialist will find in the work a critical review of the most recent additions to orthopedic surgery with the views of the author as to their value. The physiological and pathological side of orthopedics is not so fully treated as would be the case were the work from a German source, neither is there the multiplicity of devices and discussions on mechanics that one would expect from a writer on this side of the water; but there is a happy medium in the treatment of the subject which will be found satisfactory. We are somewhat surprised that apparently preference should be given to the osteoclasts of Robin and Collin over that of Grattan. The reverse is the case here. The author is evidently ingenious, as shown by his instruments for toe-drop and scoliosis, and by his operations for coxa vara, and reaching anterior spinal caries by trephining through the pedicle, lateral processes, and heads of the ribs. He advises arthrodesis at times for the hip and knee—an operation which we believe to be of rather limited value.

The views expressed on lateral curvature are interesting. We quote: "Now, no mere gymnastics of any kind, Swedish, German, American or English, will *cure* a genuine case of scoliosis. It is, however, quite otherwise with the element of mere *attitude* in cases either of genuine scoliosis or of neuromimesis." He advocates particularly the use of a poroplastic jacket with anterior supports.

A most excellent chapter is that on the application and management of plaster-of-Paris, poroplastic felt, etc.

A MANUAL OF OTOLOGY. By GORHAM BACON, A.B., M.D., Professor of Otology in Cornell University Medical College, New York; Aural Surgeon, New York Eye and Ear Infirmary. With an introductory chapter by CLARENCE J. BLAKE, M.D., Professor of Otology in Harvard University. Second edition, revised and enlarged; 114 illustrations and three plates. Pp. 422. New York and Philadelphia: Lea Brothers & Co., 1900.

IN the new edition of Bacon's excellent manual there has not been occasion to change the instruction so well imparted in the first publication (less than two years before), and it is mainly the additions that need comment here. There are changes in the type and section headings, which, with new illustrations, improve the appearance, and a colored plate is added, fairly portraying nine conditions of the drum-head. Especially notable is the extended introduction by Professor Blake, with its comprehensive view of the otological field and its reiterated demand for more intense but broad-minded specialism. Preaching only what he practises, no one can better than Dr. Blake insist upon the need of profound preparation in anatomical, physiological, and physical study for the making of a real specialist, nor can more consistently urge maintaining touch with all of the general aspects of medicine and enlisting the aid of the family physician in the study and care of aural cases. There is correction in the anatomical and other chapters of some of the minor points which the reviewer previously criticised, and new paragraphs enforce some of the lessons which before in the very condensed work seemed too briefly treated. Especially is the matter of intravenous transfusion of salt solution carefully described in detail, with the notable gains which it has made in combating shock after operations upon the sinus and cerebrum. Yet there is little change of the simple, direct, personal treatise which appeals so strongly to most of its readers; and one has to know the huge experience and ripe skill of the author to read between the lines of this unassuming manual how much more fully every topic might have been expounded and illustrated. The presentation of illustrative cases sparingly used is particularly happy both in their choice and in the terse, clear way in which they are narrated. The work promises to hold its place at the head of the list of otological text-books for the student. B. A. R.

DISEASES OF THE GENITO-URINARY SYSTEM. A THOROUGH TREATISE ON URINARY AND SEXUAL SURGERY. By EUGENE FULLER, M.D., Professor of Genito-urinary Diseases in the New York Post-graduate Medical School, etc. New York: The MacMillan Company, 1900.

THIS work of Dr. Fuller's occupies the rather unique position, as noted on the title page and in the preface, as being one devoted solely to the surgery of the genito-urinary tract, the consideration of venereal diseases forming no part of the volume whatever. That it should require 700 pages to discuss this subject fully only goes to demonstrate further the remarkable strides this special branch of surgery has made in the past few years. The author, in his preface, states what must be apparent to all readers of the various systems of medicine and surgery, that the main fault to be found with them lies in the fact that they have not been the product of a single mind, and that as a result the articles upon genito-urinary surgery in such works have been so often put into the hands of general surgeons that they are found to contain little more information upon the subject than could be gathered in works on general surgery. While acknowledging the correctness of this criticism, we are hardly ready to accept the plea of Dr. Fuller for a still further separation of the field of surgery into genito-urinary surgeons and specialists in venereal diseases. This proposition is one that would appear to us should be settled according to the special bent of the surgeon's mind; to make two distinct branches of medicine out of what is inseparably connected, logically and anatomically, seems to be specialism carried beyond the limit. As a treatise devoted solely to the treatment of the purely surgical problems of the genito-urinary system, the author has given us one of the very best works upon this subject before the medical public to-day. The chapter devoted to the treatment of stricture and the subject of catheterization is especially to be commended. We particularly note the writer's restrictions upon the indiscriminate irrigations of the urethra so much in vogue in certain quarters, which are known to cause great damage to the mucous membrane of the urethra when improperly or injudiciously applied. As might be expected from Dr. Fuller, considerable attention is devoted to diseased conditions of the seminal vesicles. As the author has been a pioneer in this field of genital disease, his statements upon this subject can be said to be authoritative. In discussing the matter of hypertrophy of the prostate the author gives his personal preference to prostatectomy where any radical operation is to be performed upon the gland. As regards the Bottini operation, he calls attention to the fact, which is only too apparent, that the cicatricial stenosis resulting from the cautery will gravely complicate a subsequent prostatectomy in cases where the Bottini operation has failed. A review of this most valuable contribution to genito-urinary surgery would be incomplete were we to fail to call attention to the artistic work of the publishers in giving us a volume the type of which is almost perfect, the plates chiefly new and all excellently finished.

H. M. C.

HANDATLAS DER ANATOMIE DES MENSCHEN, IN 750 THEILS FARBIGEN ABBILDUNGEN MIT TEXT. Mit Unterstützung von WILHELM HIS, Bearbeitet von WERNER SPALTEHOLZ. Dritter Band, I Abtheilung. Leipsic: S. Hirzel, 1900.

THE earlier parts of this work were reviewed at some length in this JOURNAL. The fasciculus now under consideration, Part I. of the second volume, treats of the alimentary and the respiratory systems, the urinary apparatus, and the male and female generative organs. This part includes 139 pages of text and illustrations, the latter numbering 159, many of them being colored.

The illustrations are exceedingly attractive in appearance, and, for the most part, are of great value; but they repeat the fault of very many current anatomical pictures in being too diagrammatic and in thus lacking realism. This is notably true, for example, of the representation of the submaxillary gland in Fig. 541, and of the œsophagus in Fig. 556, and of many of the pictures of the abdominal viscera.

While so much may be said in criticism, there is much to be said in praise of the work. Each of the departments of anatomy considered in this part is thoroughly illustrated, and many of the illustrations are new as well as original. The depicting and naming of the different parts of the several regions of the body is a feature of this as of the earlier portions of the work. Especially to be commended in this regard is Fig. 513, " the oral aperture and its environs."

The text is clear and concise, and, though brief, is sufficiently full to elucidate the drawings. J. C. H.

APPENDICITIS AND ITS SURGICAL TREATMENT. By HERMAN MYNTER, M.D. Philadelphia: J. B. Lippincott Co., 1900.

IN this little book the author has presented briefly and systematically the subject of appendicitis. He has quoted the views of many authors, both at home and abroad. He has stated clearly and concisely conclusions based upon his study and practice. The book is a résumé of the literature of appendicitis, together with the personal experience of the author.

The ideas regarding appendicitis held by surgeons of different nationalities are stated very attractively. To one familiar with the subject this book is of little real value. To one looking for a brief statement of the salient facts concerning the disease, the book is somewhat attractive. C. L. S.

PROGRESS
OF
MEDICAL SCIENCE.

MEDICINE.

UNDER THE CHARGE OF
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The Treatment of Werlhoff's Disease by the Intravenous Injection of Bichloride of Mercury.—LUSIGNOLI (*Archives Générales de Médecine*, January, 1901, p. 27), in an article on Werlhoff's disease (purpura hemorrhagica) strongly supports the view that this affection, together with scorbutus, purpura, and peliosis rheumatica, is probably due to a general bacterial infection. He points out that in Werlhoff's disease some observers think that there is a specific micro-organism and that others believe that various pyogenic organisms may be responsible for the symptoms. Thus the staphylococcus aureus and staphylococcus albus have both been found in the blood cultures. His own experience has been that the disease is not due to a specific micro-organism but to various pyogenic bacteria.

Regarding Werlhoff's disease as a bacterial infection, Lusignoli was induced by the success attending the intravenous injection of quinine in pernicious malaria, recommended by Bacelli, and also of bichloride of mercury in syphilis and in some cases of erysipelas, to give intravenous injections of bichloride of mercury in this disease also. The injections are made once daily until the condition of the patient is materially improved. They are made into the basilic, cephalic, median basilic or median cephalic vein, according as to whether one or the other happens to be the most prominent. From 1 to 4 milligrammes are given at each injection. The injections are made with an " ordinary Pravatz syringe." He cites in detail only one case of Werlhoff's disease in which this treatment was used. The patient had numerous skin ecchymoses and there had been several severe attacks of hæmatemesis. The patient recovered after several injections. No mention is made of a bacteriological examination of the blood. In another case he was apparently not so successful, for he merely states that the patient came under observation too late for the treatment to be successful. In two other cases the results obtained were excellent. Lusignoli also reports the cure of a case of peliosis rheumatica and of a case of scorbutus by the same line of treatment.

Lusignoli concludes his article with the following statements:

1. The hemorrhagic affections (scorbutus, Werlhoff's disease, purpura) are due to special micro-organisms, the products of which penetrate into the blood.
2. The various hemorrhagic affections are of the same nature, only differing in degree.
3. Intravenous injections of bichloride of mercury cures the affections.

A justifiable criticism of Lusignoli's conclusions is that if they are based on his experience as given in his article they are drawn from insufficient data. The suggestion as to a means of treating these hemorrhagic affections is interesting, however.

Suppurative Complications of Typhoid Fever.—PROCHASKA (*Deutsch med. Wochenschrift*, 1901, xxvii., 132) examined bacteriologically twenty-two cases of suppurative complications of typhoid fever in Eichhorst's wards. For the most part the observations were made upon deep abscesses which extended into the muscular tissue, and also periosteal abscesses. In many patients the points of suppuration were multiple. In one instance a general sepsis developed. For the most part these suppurations developed late in the course of the disease. In but a few instances was there any rise of bodily temperature as a result of the complication, most of the cases appearing after defervescence. The bacteriological examination showed staphylococci in the majority of cases. Only six times were mixed infections or other organisms to be found; streptococci in pure culture in two cases; streptococci and staphylococci together in two. In one case in which otitis media followed a severe angina staphylococcus aureus and diphtheria bacilli were obtained in the pus, although the latter had not been found in the throat. In one case, that of a deep gluteal abscess, characteristic typhoid bacilli were found in pure culture.

A Contribution to the Study of the Tendon Reflexes in Typhoid Fever.—REMLINGER (*Revue de Médecine*, 10 Janvier, 1901, No. 1, p. 46) records that the first reference found in the literature to the condition of the reflexes in typhoid fever was made by Strümpell in 1878. He found that they were increased during convalescence from the disease. Several reports on the same subject have appeared since that date, and these the writer briefly reviews. The results of the investigation have been most contradictory. The patellar reflex was found diminished by Petit, Clerc, Olive, de Fleury, Delom-Sorbé, and Beaujeu. It was claimed to be exaggerated by Strümpell, Gilbert Ballet, Pluyand, Perret and Devic, and Renard. According to Albouze, the patellar reflex is diminished during the acute stage of the fever, and increased during convalescence. Renard believed that there was a close parallel relationship between the knee-jerk and the foot clonus. On the other hand, Albouze held that when the knee-jerks are exaggerated the foot clonus is diminished, and *vice versa*.

The previous results having been so variable, Remlinger decided to study the condition of the tendon reflexes in 100 cases of typhoid fever. The reflexes that he observed particularly were the patellar tendon reflex, patellar clonus, foot clonus, and great toe clonus elicited by percussion over the tendo Achillis. He gives clinical notes of twenty cases to illustrate the variations found in the state of the reflexes. His own results show that the effect of toxins in typhoid fever is by no means a constant one. In 29 cases the reflexes were abolished; 3 of these, or 10.31 per cent., died. In 17 cases the reflexes were diminished, death occurring in 2 cases, or 11.64 per cent. In 22 cases they were normal, death occurring in 3 cases, or 9.99 per cent. In 32 cases the reflexes were exaggerated. In the text he only accounts for 28 cases in this group, and states that 7 of the 28, or 25 per cent., died. Remlinger states that whereas there does not appear to be a very definite relationship between the severity of the typhoid attack and the effect on the reflexes, yet it would appear that exaggeration of the reflexes occurs in the severest type of cases, and in the forms which he designates as ataxic and ataxo-adynamic.

Case of Hour-glass Stomach and Pyloric Stenosis; Gastro-enterostomy; Death.—This case, reported by MARTIN and POLLARD (*British Medical Journal*, December 8, 1900, p. 1635), is one of great interest. The patient was a young single woman, aged twenty-five years, who was admitted to the University College Hospital, London, complaining of pains in the stomach, vomiting, and flatulence. She had had gastric symptoms for ten years. For the first five years they had not been severe, but for the last five years they had been marked, commencing with vomiting after taking food. Severe pain preceded the vomiting, which relieved it. There had never been hæmatemesis. Vomiting, pain, and flatulence continued up to the time the patient was admitted to the hospital. For two years she had been able to take only soft articles of food.

On examination the skin showed quite marked pigmentation. The epigastrium was unduly full. Irregular peristaltic waves were observed passing from left to right. Large amounts of material were vomited. These facts indicated dilatation of the stomach, with some obstruction. The stomach contents showed the usual features of dilatation and stagnation, including yeast cells and sarcinæ on microscopical examination. There was marked hyperchlorhydria. The amount of free HCl was 0.3 per cent. The washing of the stomach showed that there was constant secretion into it. An interesting observation in connection with subsequent developments in the case was made by the house surgeon, who was in immediate charge of the patient. He found that on emptying the stomach and then introducing a known quantity of fluid into it he was unable to recover as much as he put in. The importance of this was not recognized at the time. The subsequent explanation was that the fluid had escaped from the cardiac into the pyloric compartment. No tumor could be felt, and malignant disease seemed improbable from the long duration of the symptoms. The case was regarded as probably one of pyloric constriction due to a cicatrized ulcer, although there had been no hæmatemesis.

An operation was performed on April 27, 1900. In the neighborhood of the pylorus a hard mass three or four inches in diameter was detected. It involved the pyloric end of the stomach, the first part of the duodenum, the gastrocolic omentum, and the first part of the transverse colon. Gastro-enterostomy was considered the operation indicated. An anastomosis between the stomach and duodenum was performed. No suspicion of an hour-glass contraction of the stomach was held at the operation. The patient had frequent attacks of vomiting after the operation, and died four days later.

The autopsy showed a remarkable condition of the stomach. The viscus was markedly dilated, and was divided into two compartments by an hour-glass constriction separating the fundus from the middle and pyloric regions of the stomach. In addition there was stenosis of the pylorus. The first constriction was extreme, and was about half an inch in width and a quarter of an inch in length. On the proximal side of the constriction there was a small irregular ulcer which had perforated and formed a small abscess at the lesser curvature border. The pyloric opening was only one-quarter of an inch in diameter. It led into a markedly constricted first part of the duodenum and also into an abscess cavity two and one-half inches in diameter. The abscess was due to a perforation beyond the pylorus.

The gastro-enterostomy had been made between the second compartment and the duodenum, and consequently no relief resulted. The writers state that had the hour-glass constriction been recognized at the operation communication between the two compartments would have been established either by gastroplasty or by gastro-anastomosis with probably different results.

The authors think there is no adequate explanation for the first stricture, but think it probably due to chronic ulceration which led to persistent contraction of the circular muscular fibres. They think that the pyloric constriction was due to a duodenal ulcer.

On the Relation of Chronic Interstitial Pancreatitis to the Islands of Langerhaus and to Diabetes Mellitus.—In 1869, Langerhaus, who was the first to make a careful histological study of the pancreas, described groups of cells situated between the acini and differing markedly from those of the ordinary glandular type. Subsequently these groups of cells have come to be designated the "islands of Langerhaus." Some have held that these islands consisted of follicles of lymphatic tissue; others that they were formed during embryological life and subserved some special function. Lewaschew believed he could multiply them by prolonged stimulation, by overfeeding, or by the repeated administration of pilocarpine. Laguesse, Schäfer, and Diamare suggested that they furnish an internal secretion which influences carbohydrate metabolism. The only evidence in favor of this view is that quite recently advanced by Ssobolew, who found that the cells of the islands became more granular after feeding animals on carbohydrates. He observed that the islands of Langerhaus were not involved in the sclerotic process which ensues after the ligation of the duct of Wirsung in dogs. He believed that this fact explains the absence of glycosuria after ligation of the duct.

OPIE (*The Journal of Experimental Medicine*, vol. v., No. 4, January 15, 1901) has made a special study of these islands in man and in lower animals, in infected specimens, and in glands stimulated by the administration of pilocarpine, and finds: 1. That the islands of Langerhaus are composed of cells having the same origin as those of the glandular acini, but forming structures which are independent of the secreting apparatus and in intimate relation with the vascular system. 2. That in the splenic end of the cat's pancreas they have a definite position within the lobule, each of which contains one of these structures. 3. That in the human pancreas they are more numerous in the splenic extremity or tail than elsewhere. 4. That prolonged stimulation of the gland does not, as claimed by Lewaschew, transform groups of acini into the islands of Langerhaus.

Opie has studied the relation of chronic interstitial pancreatitis to the islands of Langerhaus both in infants and adults. He states that there has never been a satisfactory classification of cases of chronic interstitial pancreatitis in adults. From a study of the cases which have come under his observation he recognizes two distinct types: 1. The interlobular, in which the connective tissue is increased between the lobules, the intralobular or interacinar tissue being little, if at all, increased. 2. The interacinar, where the interlobular tissue is only slightly altered, while fibrous tissue, which replaces the parenchyma, separates individual acini. The subject is discussed at considerable length, and the histological findings in several cases is given. There is also an interesting consideration of the relation of interstitial pancreatitis and the lesions of the islands of Langerhaus to diabetes mellitus.

Opie sums up the results of his studies as follows:

1. Congenital syphilitic pancreatitis retards the development of the glandular acini but does not affect the islands of Langerhaus. Embedded in the stroma, but not invaded by it, the latter maintain their continuity with the small ducts and acini with which they have a common origin.

2. Two types of chronic interstitial inflammation affecting the developed pancreas are distinguishable:

(*a*) Interlobular pancreatitis. In the interlobular variety the inflammatory process is localized chiefly at the periphery of the lobule and implicates the islands of Langerhaus only when the sclerotic process has reached a very advanced grade. When pancreatitis has followed obstruction of the ducts the islands long remain unaltered, though embedded in dense scar-like tissue.

(*b*) Interacinar pancreatitis. In the interacinar type the process is diffuse, invading the lobules and separating individual acini. The inflammatory change invades the islands of Langerhaus.

3. A relationship has been observed between lesions of the islands of Langerhaus and the occurrence of diabetes mellitus.

(*a*) In one of eleven cases of interlobular pancreatitis diabetes of mild intensity occurred. The sclerosis, which in this case followed obstruction of the ducts by calculi, was far advanced and affected the islands of Langerhaus.

(*b*) In two of three cases of interacinar pancreatitis diabetes was present. The third case was associated with a condition, hæmochromatosis, which at a later stage is associated with diabetes, the result of pancreatic lesion.

(*c*) In a fourth case of diabetes hyaline deposit between the capillaries and the parenchymatous cells had so completely altered the islands of Langerhaus that they were no longer recognizable.

Opie is strongly of the opinion that lesions of the islands of Langerhaus are very intimately associated with the etiology of the cases of pancreatic diabetes.

A Report on the Cases of Typhoid Fever Admitted into the Royal Victoria Hospital (Montreal) During 1900.—GILLIES (*The Montreal Medical Journal*, February, 1901, p. 99) reports that 151 cases of typhoid fever were treated in the Royal Victoria Hospital in 1900. Of these, 76 were males and 75 females. As 22 of the cases were still under treatment at the time the report was issued, the statistics are made up from the balance of the cases, or 129 in all. Of the 129 cases, 10 died, giving a mortality of 7.7 per cent.

The third decade claimed the largest number of cases. There were 55 patients between the ages of twenty and thirty years. Regarding the symptoms, it is interesting to note that diarrhœa was present at the onset in 25.6 per cent. of the cases. Vomiting occurred at the onset in 26.3 per cent., and during the course in 13.9 per cent. of the cases. Rose-spots were present in 69 per cent. of the cases, and there was a palpable spleen in 61.2 per cent. Relapses occurred in 5.4 per cent., the shortest and longest duration of the relapse being eleven and twenty-two days respectively. In one case the interval between the initial attack and the relapse was three months. The Widal reaction was reported on in all but 4 cases. In only 1 case was it negative throughout the course of the disease. The earliest day on which it appeared was the fourth, and the latest the thirty-third day. Ehrlich's reaction was present in 34 per cent. of the cases.

Meteorism was present in 20 per cent. Perforation of the bowel occurred in 4 cases. Of these 4 cases 1 recovered after operation. The operation was performed eighteen hours after the time the perforation occurred, which happened on the twelfth day. Intestinal hemorrhage occurred in 12 cases, and was the direct cause of death in 3 cases. Femoral phlebitis occurred in 7 cases, and brachial phlebitis in 1 case. Suppurative otitis media occurred in 4 cases, and periostitis in 3 cases.

A Case of Myositis Ossificans Progressiva.—WILKINSON (*The Quarterly Medical Journal*, November, 1900, p. 24) reports a case of myositis ossificans progressiva in a boy, aged thirteen years. The boy was healthy until he was two and a half years of age. About this time some isolated hard lumps were observed on his back. These gradually extended and joined together. When the boy came under observation at the age of thirteen, a striking bony mass extended over the back from immediately to the right of the lowest lumbar spine, passing over to the left in the lower dorsal region, and thence spreading over the left scapular and interscapular regions, and crossing the upper dorsal spines to the inner border of the right scapula at its upper part, the whole mass much resembling a single branched antler of a stag. There were other nodules over the back. The bony masses were fixed to the spine and ribs beneath, and the skin was only slightly movable over their more prominent parts. The whole back was rendered stiff, and he had never been able to entirely dress himself on this account. The boy was unable to open his mouth owing to supposed involvement of the temporal muscles. Increased firmness of or definite nodules in various other muscles were made out. Thus, certain of the neck, arm, anterior thoracic, abdominal, thigh, and leg muscles were involved. The thumbs and great toes presented the condition known as microdactyly. Wilkinson noted that some of the muscle nodules had disappeared since the patient came under his observation. As a rule, the nodules had developed without pain being complained of.

Lorenz, in Nothnagel's *Specielle Pathologie und Therapie*, had collected statistics of 51 cases of this rare disease. Of these, 32 were males, 13 females, and in 6 the sex was not stated. Little is known concerning the pathology of the disease. The name myositis is held to be misleading. The deposit commences in the fibrous tissues, and the muscle fibres are never affected except by secondary atrophy. The deposit at first consists of small round cells and fibrous tissue. Sometimes cartilage is found in this, which later undergoes ossification, but more generally bone is found without the occurrence of cartilage (Zeigler). Wilkinson states that the most generally accepted view of the pathology of the disease is that advanced by Pincus, who believes it to be a new-growth and compares it to a multiple fibroma. Treatment is without avail. Death usually results from increasing fixation of the thorax resulting in suffocation, or from some intercurrent pulmonary disorder.

SURGERY.

UNDER THE CHARGE OF

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The Treatment of Appendicitis.—VERNEUIL (*Jour. de Chir. et Annales de la Soc. Belge. de Chir.*, January and February, 1901) states that, as has been observed by Broca, the true question in those cases of acute appendicitis with a circumscribed peritonitis is: Is a non-operative treatment capable of aborting a crisis if it is instituted in time, and is it to our interest whenever possible to secure this abortion and in place of operating immediately to perform an operation at some later date? To this question the author responds in the affirmative. The general opinion is that it is best to perform appendectomy if the appendix presents itself in the field of operation; but, on the other hand, it is well to guard against an extensive search and all manœuvres that might have the effect of breaking up adhesions. In conclusion it may be said: 1. That if the symptoms at the onset of the disease are very grave (vomiting, first of the stomach contents, then bilious, and, finally, fecal; constipation with no passage of gas; pain in the iliac fossa and at McBurney's point; marked tympany; dyspnœa; either a marked elevation of temperature or one that is subnormal; a pulse of bad quality, and a shrivelled face), or if there be the symptoms of a general purulent peritonitis or a diffused septic peritonitis, one should operate immediately; performing a median cœliotomy followed by appendectomy and drainage. 2. If the symptoms of the onset are those of acute appendicitis with circumscribed peritonitis (sharp pain at McBurney's point, vomiting, constipation, more or less temperature with a small regular pulse in proportion to the temperature, moderate tympany, face less shrunken and general condition fairly good); if some time has passed since the onset and one finds in the right iliac fossæ muscular rigidity and the symptoms that denote the presence of a pseudomembranous exudate, with inflamed and adherent omentum, one should adopt medical treatment (ice to the abdomen, opium, absolute rest in the dorsal position, and iced Vichy water in small quantities). The patient should be carefully watched, and the surgeon ready to intervene (*a*) if the symptoms become aggravated and if there be evidence of an extension of the peritonitis; (*b*) if the inflammatory tumor becomes larger; (*c*) if the temperature persists after forty-eight hours the tympany remaining stationary; (*d*) if the tympany shows no tendency to disappear or remains about the same. It is necessary when one operates to confine one's work to the periappendicular space; no attempt should be made to remove the appendix unless it presents itself and its removal can be accomplished without much difficulty. If this cannot be done drainage should be introduced and the appendix left *in situ*, to come away later as a slough. The best incision in these cases is that of Roux, in which the periperitoneal incision is on a line with the more deeply seated pus. 3. After repeated attacks of appendicular colic or of acute appendicitis without peritonitis, and in all of those cases after a second attack, one should perform appendectomy. The incision of choice in these cases is that of Jalaguier.

The Sterilization of the Silk Catheter.—HERMAN (*Centralblatt für Chir.*, January 19, 1901) states that a safe and convenient method of sterilization which will be suitable to all kinds of catheters is still to be discovered. The metal and the Nélaton (French) catheters are best sterilized by boiling. This method, unfortunately, cannot be used with silk catheters, which become rough and cracked if treated in this manner. In an effort to find a solution in which silk catheters could be boiled without injury, a saturated solution of ammonium sulphuricum was tried with the following results: 1. Silk catheters will stand several hours' uninterrupted boiling in this solution without apparent injury. After five hours of consecutive boiling they retained on their outer and inner surfaces a shiny appearance, did not become stiff, and, in fact, they became more elastic than ever. 2. They were found to be uninjured after repeated use and boiling at intervals. 3. Old catheters that are infected may be easily sterilized by boiling them for three to five minutes in the ammonium sulphate solution. 4. The catheters may be used as soon as they are removed from the solution. It is not necessary to dry them or remove any of the solution that may be adherent, as in not a single instance has irritation or inflammation of the urethra followed their use even when used immediately from the solution. 5. This solution is equally adapted for the sterilization (by boiling) of Nélaton catheters, and all other kinds of urethral instruments. At the present time there is no other method of sterilization of the silk catheter that combines such simplicity of technique and such absolutely good results.

Total Suture of the Bladder after Suprapubic Cystotomy in the Presence of Old Infected Calculi.—LOUMEAU (*Annales de la Policlinique de Bordeaux*, February, 1901) states that in the case of the bladder, as in all other operations, suturing is the method of choice, while drainage should be considered as the method of exception and of necessity. The author reports the case of a man, aged eighty years, who presented himself with a bad cystitis and the symptoms of a large vesical calculus. Operation being decided upon, suprapubic cystotomy was performed in the usual manner, and three large phosphatic calculi removed. The bladder was then closed by a double row of catgut sutures, and the operation completed by the insertion of two small pieces of gauze to drain the prevesical space. The patient made an uninterrupted recovery, with the exception of a slight attack of phlebitis of the left leg, which soon responded to appropriate medical treatment. Three weeks after the operation the patient returned to his home, the phlebitis had entirely disappeared, and in every way there was a marked improvement in the patient's general condition. Immediate suture of the bladder markedly diminishes the period of convalescence, and is in all cases an operation that may be performed without danger.

Tuberculosis of the Vesiculæ Seminales, Testis, and Prostate; Complete Excision of the Right Side; Incision and Curetting on the Left Side; Cured.—WALKER (*Maryland Medical Journal*, February, 1901) reports the case of a man, aged twenty-seven years, of non-tubercular family history, who presented himself for treatment with a tubercular infection of the genitalia of three years' duration. Examination showed a sinus leading down through the scrotum to the diseased right testis, which had undergone atrophy and had entirely lost the characteristics of the normal gland. The cord was uninvolved, but there was marked inflammation of all the tissues in the lower right side of the scrotum. Rectal examination disclosed on the right side an induration of about one-half of the seminal vesicle, and the same hardening in the ejaculatory ducts. The induration extended to and apparently entered the prostatic substance. On the other side the involvement was not so marked, but there was a distinctly hard infiltration, about midway of the seminal vesicle, which extended toward its apex. The ejaculatory duct on this side was soft and uninvolved. The prostate was not enlarged though slightly nodular, but everywhere soft, and presented no suspicion of disease, except where the right ejaculatory duct entered. Endoscopic examination of the bladder and urethra showed them to be normal except for a small hemorrhagic area in the posterior portion of the urethra, four centimetres in front of the prostate, probably the remains of a specific urethritis contracted five years before the onset of the tuberculosis. The urine was negative for tubercle bacilli, except on one occasion, when three very suspicious looking bacilli were found. The operation consisted in an incision in the right inguinal region, the removal of the right testis, and all the adherent diseased tissue. The incision was then carried upward and the abdomen opened. The cord was followed down and the seminal vesicles exposed. As it was found almost impossible to completely expose the seminal vesicles without separating the bladder from the surrounding structures, the patient was placed in the Trendelenburg position, and the perineum opened in the median line. The cord was pushed through this opening and the vesicles then came well into view. The right vesicle was then excised along with about one-third of the prostate gland. The left testis was not removed; the left seminal vesicle was incised, then thoroughly curetted, touched with pure carbolic acid, and finally packed with iodoform gauze. The left testicle was incised and found to be the seat of a moderate sized abscess, which was curetted, touched with pure carbolic acid, and finally packed with iodoform gauze. The epididymis was practically obliterated by the disease, and markedly infiltrated. The cord was normal, and there were no adhesions to the tunica. The abdominal wound was closed with drainage, the perineal wound was packed with gauze, and a catheter introduced into the bladder through the urethra. The patient made practically an uninterrupted recovery, and when examined, six months later, the following condition was found: The perineal wound and the wound on the right side of the scrotum had entirely healed, the left testicle was soft, and in no place indurated or hard; free in the scrotum except over upper part of the incision; nearly normal size; not tender nor painful. Examination of the rectum revealed an entire disappearance of the disease, which was present on the left side. The tissues show absolutely no evidence of disease. The patient's general condition has undergone marked improvement, and he has gained twenty pounds in weight. The urinalysis is entirely negative, and micturition is perfectly normal. The author emphasizes the importance of the combination of the inguinal and perineal incisions in the cases where complete excision is attempted. These incisions allow very much better working room, permit a more careful dissection, bring the parts better into view, and last and most important of all it permits of perineal drainage, which is the direction in which the discharges naturally tend to go. In the inguinal incision alone the bladder must be more extensively separated from the surrounding tissues and a very much larger wound is the result. This, of course, necessitates leaving large and deep pockets, which are practically almost impossible to drain. In conclusion, it may be said that this case adds some evidence in favor of conservative surgery.

Analgesia from Spinal Subarachnoidean Cocainization.—MURPHY (*Journal of the American Medical Association*, February 9, 1901) states that since the announcement of the first death from chloroform anæsthesia the medical profession has been constantly looking for an anæsthetic that might be administered without danger. Subarachnoidean spinal anæsthesia was discovered by Corning in 1884, who suggested this as a method of treating diseases of the spinal cord, but the surgical application was not considered by him. Bier demonstrated, in 1898, that analgesia of the extremities for surgical purposes could be produced by this means. The physiological effect of the application of cocaine to the spinal cord is produced by the direct application of the cocaine to the posterior roots and ganglia, and not to the cord itself. It is not a sensory tract paralysis, because the sense of contact is not affected, the reflexes are but slightly altered, being usually diminished, muscular sense and co-ordination are often affected, intestinal peristalsis and uterine contractions are rather stimulated than depressed, while the actions of the sphincteric muscles of the bladder, vagina, and rectum are often completely abolished. The above leads to the speculation, Cannot reflex ilius be treated by this means? The dose to be injected ranges from 7 to 20 minims of a 2 per cent. solution of cocaine in the adult, depending upon the individual peculiarities of the patient, the location and probable duration of the operation, etc. A 1 per cent. solution should be used in children. The cocaine solution should be freshly prepared at the time of the operation. The injection should be made with an ordinary sterilized hypodermic syringe.

The skin is prepared in the usual manner, and the space between the fourth and fifth lumbar vertebræ, one-half inch to the side of the median line, is the point of election. The fluid should be injected slowly, from forty to sixty seconds being consumed in the procedure. The solution should never be injected except when the cerebro-spinal fluid is flowing from the needle. The symptoms produced by the injection are, first, a sense of heat passing over the entire body, then thirst, and then in from seven to fifteen minutes nausea, and one or two attempts at vomiting occur. The former may continue for ten minutes or so with several efforts at emesis. Vomiting is preceded by all the symptoms which ordinarily accompany nausea from any reflex cause. The pulse may become scarcely perceptible at the wrist, and the facial expression is often that of profound depression, the capillary circulation, as a rule, remains good, and respiration is not materially affected. The sphincter ani is frequently relaxed, as is also occasionally the vesical sphincter. The relaxation of the vagina and the rectum, which is so common in cocaine analgesia, would theoretically be of advantage in obstetric cases. The analgesia usually appears in from three to ten minutes after injection, although it may be delayed to twenty or even thirty minutes. It usually commences at the feet and extends upward and may be complete, partial, or entirely absent. Its duration is from twelve minutes to three hours or more. The post-operative symptoms are usually headache, sometimes very severe and lasting for several days, but the rule is that it subsides in from twelve to twenty-four hours. Vertigo and ataxia are occasionally present, and may persist for five or six days; the pulse soon returns to normal, and temperature usually occurs in the evening following the injection. It is often preceded by a chilly sensation, and it is probably due to irritation of the thermic centre in the cervical portion of the cord. The patient's general condition on the following day, even after major operations, has been uniformly better than when ether or chloroform was used, and the tissue reaction to the traumatism has been less marked. Failure to obtain analgesia is often explained by faulty technique or selection of cases. It may be due to irregularity in the action of the drug in different cases and at different times in the same case, or to the use of a too small quantity of the solution. Chronic alcoholics seem to be unfavorably affected by the drug. The idiosyncrasy to cocaine is more frequent than to any other drug, and explains the absence of analgesia in many cases. Eucaine does not give such satisfactory results as cocaine, but its use is usually followed by the same unpleasant symptoms as when cocaine is employed. Gumprecht's statistics of seventeen deaths from lumbar puncture, performed for diagnostic purposes in the presence of severe cerebro-spinal lesion have no value as a guide as to the practicability of cocaine analgesia.

Perigastric Adhesions.—Bird (*Inter-Colonial Medical Journal of Australasia*, December 20, 1900) states that this is a very complex subject—complex in its anatomy, in its causation, and in its results—and it is only recently that its importance has been appreciated and its possibility partly understood. It is now evident that perigastric and neighboring adhesions merit especial consideration quite apart from the disease which gave them birth. Peritoneal adhesions are very common, and perigastric adhesions are said to occur in 5 per cent. of all autopsies. They vary widely in density, texture, size, and shape, are due to a variety of causes, of which syphilis is undoubtedly the origin in some cases. They tend to disappear in some instances, and in some cases may produce no symptoms, while in others they give rise to very grave ones. The author especially draws attention to the slight forms of perigastric adhesion, which may be classified by their causation thus: 1. Those induced by gastric duodenal ulcers. 2. Those whose infection arises from the bile ducts. 3. Those due to syphilis. 4. Those of uncertain origin. 5. Some cases are undoubtedly traumatic in origin. By their symptoms they may be arranged into those which cause pain as the clinical symptoms and those which constrict natural passages, such as the bile duct or the duodenum, causing jaundice and distention of the gall-bladder in the first case, and dilatation of the stomach as the chief clinical phenomenon in the other. The most characteristic symptoms of the slight perigastric adhesion is epigastric pain started or increased by any sort of food. The pain caused by an adhesion is definitely localized, the patient putting the finger right over the spot where operation subsequently proves the lesion to be, while, on the other hand, the pain of acute inflammation is often referred to a point far distant from the actual seat of inflammation. There is usually more or less pain after eating, coming on half an hour after food is taken, and so is intermediate between the immediate pain of ulcer and the delayed pain of atonic dyspepsia. Sometimes this pain is at once relieved by the patient assuming the recumbent posture. Movement either arouses or aggravates the pain. The severity of the pain is no index to the size of the adhesion, and the pain may range from a dull one to really extreme agony. In no case is the pain accompanied by an elevation of temperature. The general health may suffer much in some cases, while in others it is but slightly affected. Pain distinctly epigastric in position and bearing more or less definite relation to gastric locomotion is then the earliest symptom, and herein lies the main distinction from malignant diseases of the stomach, of which pain is not at all a marked symptom until late in the disease, when in most cases a palpable tumor has formed. Vomiting is not a prominent symptom, and when it does occur the vomited material does not show signs of gastric digestion having been delayed. The presence of jaundice is usually an accident, but in some cases it may help in forming a probable diagnosis in these cases. The futility of medicinal and dietetic treatment is of great value, not only as a means of diagnosis, but also as an indication of the necessity of operative interference. Persistent local pain, disability of the patient, loss of general health, strength, and vigor, or the inefficiency of the physician's treatment, all point toward an exploratory laparotomy, which should be performed in the usual manner, and which is the only method which will permanently cure perigastric adhesions. Under proper aseptic precautions it is an operation that may well be regarded as being without any mortality.

PEDIATRICS.

UNDER THE CHARGE OF

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Observations Upon Fœtal Rickets.—Fede and Finizio (*Revue mensuelle des Maladies de l'Enfance*, March, 1901, p. 101) continue the observations upon this condition inaugurated by Fede and Cacace and reported by them to the Congrès de Pédiatrie held in Turin in 1898 (*Pediatria*, February, 1900). [See abstract in this department of the American Journal of the Medical Sciences, September, 1900, p. 353.] In this earlier communication Fede and his assistant reported the results of examinations of 500 new-born infants, among which only one case was found that could be said to have the clinical signs of rachitis, and only four with craniotabes alone. The present paper gives the results of the study of 475 infants observed in the same hospital (Maternità degli Incurabili) in Naples. Of the entire number only 3 showed some of the clinical signs of rachitis, 3 others had only craniotabes, and 4 double genu varum.

In all their observations they have frequently encountered irregularities of the cranial bones, a large anterior fontanelle, with unclosed posterior and lateral fontanelles, and open sutures. This they consider rather as an instance of insufficient development than an expression of rachitis. Microscopical examination of the cranial bones in cases presenting widely open fontanelles and separated sutures has failed to show any lesions recalling those of rachitis. None of them showed the rich vascular network which, according to Kassowitz, is never wanting even in the slightest degrees of rachitism.

The result of this second series of observations serves to confirm the conclusion reached in the earlier work, that fœtal rickets is extremely rare, and to prove in addition that in the new-born large fontanelles and separated sutures are not always indications of rachitis, but that in the majority of cases at least they prove only a retarded ossification.

The Causation of Infantile Scurvy.—C. C. CORLETTE (*British Medical Association Meeting*, August 13, 1900; *Pediatrics*, February 15, 1901, p. 142) advances the hypothesis that infantile scurvy is due to a deficiency of citric acid, which is a normal constituent of fresh milk, a quart of cow's milk containing as much citric acid as a large lemon. This acid exists in milk as a calcium salt, probably the normal calcium citrate, and may be present either in crystalline or amorphous form. The amorphous salt is more soluble in both cold and hot water than the crystalline, and by boiling for a sufficient time it is converted into the latter. When milk is heated to the boiling-point its power of holding citric acid as calcium citrate is greatly diminished, and by so much the more as the citrate is converted into the crystallizable form; and in proportion to the degree of saturation existing in the fresh milk, so is the tendency of the salt to precipitate out and be more or less lost· Since the sterilization of milk involves boiling, it is easily seen how the restriction of diet to sterilized milk may cause a deficiency in the supply of citric acid to an infant, and if deficiency of citric acid be a cause of scurvy the incidence of this disease during the prolonged administration of a cooked or sterilized milk diet is easily explained.

This hypothesis would also explain why the disease does not occur when the milk is only pasteurized, especially when the process of pasteurization is carried out on a large scale.

The following precautions are suggested for the purpose of diminishing as far as possible the loss of citric acid in the boiling of milk: Any water to be used in the formula should be added to the milk before the boiling, so as to get a less concentrated solution of the citrate than obtains in the undiluted milk, and therefore one less likely to suffer loss of this salt by its comparative insolubility after boiling. Further, the milk should not be boiled a moment longer than the occasion requires, should be allowed to cool in the vessel in which it has been boiled, and should be well stirred when cool enough, in order to redissolve the converted crystallized citrate as far as possible.

Finally, to make the milk retain better the precipitated crystals in suspension, the addition of a gummy substance before boiling is suggested. The milk, too, may possibly be made a better solvent of calcium citrate by the addition of an alkaline phosphate, such as sodium or potassium phosphate. Milk normally contains a small amount of potassium phosphate, and this salt may be one of the factors, the author thinks, in helping to make milk a better solvent of calcium citrate than is water. The addition of a small amount of an alkaline phosphate, about ten to fifteen grains to the pint, should therefore help to increase the power of dissolving the citrate.

Position of the Cæcum and the Appendix in the Child.—VALLÉE (*Thèse de Paris*, 1900) bases his thesis upon post-mortem examinations of 100 children, and draws the following conclusions:

1. The cæcum in the child occupies a higher position than in the adult. In 72 cases out of the 100 it is situated above the right antero-superior iliac spine, while in the adult it is below this point. It may be entirely to the left of the median line without inversion of the abdominal organs, as occurred in one of his cases.

2. The position of the appendix depends upon that of the cæcum, and is therefore high. In 78 cases it is entirely above a plane passing through the antero-superior iliac spines. Its mean length is about 5 centimetres, and its direction is most frequently vertical, upward or downward.

3. The colon is kept in place by a peritoneal fold which is reflected upon the posterior abdominal wall at the level of the iliac crest. This mesocolon may be wanting, and the posterior surface of the colon may be without serous envelope. The mesoappendix comes from the mesentery sometimes, but rarely from the colic peritoneum. In half the cases a peritoneal fold arises from the mesentery or from the base of the appendix to be reflected upon the iliac vessels. Other folds of peritoneum come from the appendix to form the ileocæcal fossa. In one case a serous ligament united the base of the appendix to the summit of the bladder.

Whey-cream Modifications in Infant Feeding.—FRANKLIN W. WHITE and MAYNARD LADD (*Philadelphia Medical Journal,* February 2, 1901, p. 218) present a valuable study of milk modifications with special reference to the differential modification of the proteids. Their results are briefly summarized as follows:

1. By the use of whey as a diluent of creams of various strengths we are able to modify cow's milk so that its proportions of caseinogen and whey proteids will closely correspond to the proportions present in human milk. We, therefore, render it much more digestible and suitable for infant feeding.

2. The best temperature for destroying the rennet enzyme in whey is 65.5° C. Whey or whey mixtures should not be heated above 69.3° C. in order to avoid the coagulation of the whey proteids. The percentage of whey proteids in the whey obtained by us was 1 per cent., while in the analysis of the whole milk approximately three-quarters of the total proteid was caseinogen and one-quarter was whey proteids.

3. On the basis of these analyses we were able to obtain whey-cream mixtures, with a maximum of 0.90 per cent. and a minimum of 0.25 per cent. of whey proteids in combination with percentages of caseinogen varying from 0.25 per cent. to 1 per cent.; of fats, from 1 to 4 per cent.; of milk sugar, from 4 to 7 per cent.

4. The emulsions of fat in whey, barley-water, gravity cream, and centrifugal cream mixtures were the same, both in their macroscopical and microscopical appearances. The combination of heat and transportation, such as sometimes occurs in hot weather, partially destroys the emulsion in all forms of modified milk, but this disturbance can be prevented by the simple precaution of keeping the milk cool during delivery.

5. Whey-cream mixtures yield a much finer, less bulky, and more digestible coagulum than plain, modified mixtures with the same total proteids; the coagulum is equalled in fineness only by that of barley-water mixtures. The coagulum yielded by gravity cream mixtures and centrifugal cream mixtures is the same in character.

The Glycolytic Power of the Tissues of the Nursling in Health and in Gastro-enteritis.—TERRIEN (*Revue mensuelle des Maladies de l' Enfance,* January, 1901, p. 31) states that the power of transforming sugar, as is well known, is not confined to the liver, but is possessed in a certain measure by the other tissues of the body, and that consequently an experimental alimentary glycosuria indicates only a general glycolytic insufficiency (in liver and tissues).

In every experiment having for its object the measure of the functional power of the liver, it is therefore important, as Achard and Castaigne have shown, to diminish previously the glycogenic power of the tissues. This point, so important in investigations upon the adult, is none the less so with the nursling, and the author therefore has made some investigations to determine whether the glycogenic power of the tissues varies in notable degree with infants in good health and those suffering from gastro-enteritis. By means of subcutaneous injections of pure sterilized glucose a determinate quantity of sugar may be introduced into the general circulation, and thus by gradual increase of the dose until glycosuria appears one may readily determine with exactness the glycolytic power of the tissues in both classes of infants.

The result of these experiments shows that the glycolytic power of the tissues of the nursling is relatively high, since the quantity of sugar so convertible varied between 50 and 80 centigrammes per kilogramme of weight, while the liver arrests only about 4 or 5 grammes; that inversely with what is observed in the liver the glycolytic power of the tissues remains about constant, whether the experiment be made upon a healthy infant or upon one suffering from gastro-enteritis; that, consequently, it is not necessary to take into account this possible source of error in investigating alimentary glycosuria in the nursling.

THERAPEUTICS.

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Treatment of Pancreatitis.—DR. MAYO ROBSON says that operative treatment of acute pancreatitis, especially when of the suppurative variety, is alone indicated. The symptoms being so vague, however, such a radical procedure may not always be justified. Morphine for pain and aperients to relieve distention are advisable. Subacute pancreatitis is more amenable to treatment. Distention, when present, calls for gastric lavage, and turpentine enemata or calomel by the mouth. Calomel is distinctly valuable, acting as it does as an intestinal antiseptic. It should be given in five-grain doses followed by a saline aperient. Diarrhœa, which is apt to supervene after the constipation is relieved, should be controlled by salol and bismuth. Abdominal section and drainage may be indicated. Chronic pancreatitis should be treated by abdominal section and drainage.—*British Medical Journal*, 1901, No. 2106, p. 1129.

Treatment of Strychnine-poisoning by Inhalations of Oxygen.—DR. M. C. OSTERWALD draws attention to the early studies of von Leube and Rosenthal, who showed the widest beneficial results of artificial respiration in strychnine-poisoning, convulsions ceasing or markedly diminishing while the respiratory movements were being practised. Two theories have heretofore been in vogue to explain this phenomenon. According to one the increased respiratory movements bring about accelerated gaseous exchange, which in its turn favors the organic combustion of the poison circulating in the blood. Another hypothesis attributes the results to the reflex action on the pneumogastric. In order to determine the correct position if possible, the author substituted oxygen inhalations for artificial respirations. Early experiments convinced him that it was not possible to accustom animals to the action of strychnine, the same dose producing similar effects in every trial. This afforded a definite starting-point. The influence of free oxygen was very marked. Guinea-pigs would take more than double the convulsive dose if breathing oxygen, and, on the contrary, they succumbed very rapidly to a much smaller dose if the air was below its normal oxygen content. The results indicate a practical procedure in the treatment of this fortunately rare form of poisoning.—*Archiv für experimentelle Pathologie und Pharmakologie*, 1901, vol. xliv., S. 451.

Interesting Case of Idiosyncrasy.—DR. SUTHERLAND details the aberrant effects of quinine, morphine, and strychnine in a woman, aged thirty-three years, who has been in good health at least since 1887. Quinine even in small doses produces a universal nettle-like eruption. The same phenomenon is noted after bathing in salt water and also in warm weather, thus showing a heightened skin irritability. Morphine acts only as an irritant. Thirty minutes after taking a dose she is nervous and restless and has a sensation of impending death. Strychnine causes a marked itching of the palms of the hands and soles of the feet. This sensation of itching becomes universal if the dose is increased. Suggestion plays no part in the phenomena.—*Münchener medicinische Wochenschrift*, 1901, vol. xlviii., S. 525.

Sodium Persulphate and Metavanadate.—DR. ALBERT ROBIN in a short note comments on the use of sodium persulphate and metavanadate in tuberculosis. He has found that these remedies have no special action, but that both stimulate the digestion very markedly, and their beneficial action is thus to be explained. Of the persulphate of soda he prescribes: Sodium persulphate, 2; water, 300. A tablespoonful should be administered one-half hour before meals. If this remedy does not stimulate the appetite within six days it is useless to continue its administration. As far as the metavanadate is concerned, some patients are acted on better by it; some by the persulphate. In general he has found that the metavanadate has a better action. It is prescribed: Sodium metavanadate, 1; water, 5000. This is given in teaspoonful doses half an hour before meals. The remedy should not be continued for more than four days consecutively.—*Les Nouvelles Remedies*, 1900, vol. xvii. p. 49.

Antagonism of Atropine and Morphine.—DR. ERNST F. BASHFORD has contributed an excellent pharmacological study bearing on the mutual antagonism of these drugs. One point at least of therapeutic interest is brought out, and that is that the antagonism is said to be not as pronounced as others have claimed, notably Binz and Kobert. The former in cases of opium-poisoning administers as much as one-sixth to one-tenth of a grain of atropine, while Kobert recommends one-sixtieth of a grain every half hour. Bashford claims that these doses are far too great, and recommends that a single dose only of one forty-fifth of a grain should be given.—*Archives Internationales de Pharmacodynamie et de Therapie*, 1901, vol. viii. p. 311.

Urotropin in Pyelitis.—DR. J. POLLOCK SIMPSON reports on the use of this drug in acute and chronic cystitis. In one case reported the urine was markedly fetid and much pain was experienced during urination and in the interval. Six-grain doses relieved the pain and cleared up the urine. The odor disappeared and the pus quickly disappeared, and in a few weeks the patient was free from severe paroxysmal attacks of cystic colic. In another case a chronic cystitis was accompanied by an ulceration at the base of the neck of the bladder. Notwithstanding free curetting of the ulcerated area, improvement did not follow until after the administration of this remedy.—*The Therapist*, 1901, vol. vii. p. 81.

Dryopteris Spinulosum.—DR. H. WOLFF reports the use of the ethereal extract derived from this substance in place of that of male fern in six cases of tænia in children aged from ten months to thirteen years. The action was satisfactory, and no untoward effects were observed.—*Archiv f. Kinderheilkunde*, 1901, vol. xxxi., S. 74.

[The experience of others working with *dryopteris spinulosum* is in accord with these observations.—R. W. W.]

Typhoid in Children.—DR. H. STOWELL says that intestinal antisepsis is of prime importance. Laxatives are called for during the first few days. Calomel, one-tenth of a grain every hour, is antiseptic to some degree, and promotes glandular activity in the liver and intestines. Salol is his favorite drug. This is an excellent antifermentative and antiseptic. It breaks up in the intestine and becomes carbolic acid and salicylic acid, but untoward results are not common. Magnesium citrate during the first week is advised. Good results from using the well-known tablets of podophyllin, calomel, guaiacol, and menthol are reported. During the third week the soft, compressible pulse of a flagging heart needs help. Strychnine, digitalis, camphor, and ammonia will spur it on by increasing the systole. Coffee may be given by mouth or per rectum. Occasional doses of antipyretics of the coal-tar group may be given in particular cases and be very helpful, but their effect on the circulation should be watched.—*Archives of Pediatrics*, 1901, No. 4, p. 271.

Anti-typhoid Inoculations.—DR. A. E. WRIGHT reports on the results obtained by such inoculations in Egypt and Cyprus during the year 1900. Of a total number of 2669 uninoculated and 720 inoculated soldiers, 68 of the former and 1 of the latter contracted the disease. The proportion, therefore, was 2.50 to 0.14 of incidence. The reduction was nineteenfold. The one patient of the inoculated series was taken ill shortly after the time of inoculation, and it is possible that he had the disease prior to this.—*British Medical Journal*, 1901, No. 2105, p. 1072.

Treatment of Rheumatoid Arthritis.—DR. P. W. LATHAM, basing his treatment on the hypothesis that rheumatoid arthritis is a disease of the trophic centres situated in the spinal cord, advocates the use of continuous counter-irritation along the spine in the early history of the acute polyarticular variety. When the disease is advanced, however, the ends of the bones enlarged, and the cartilage destroyed, one cannot hope to reduce such by counter-irritation. In these chronic cases, however, in which there are acute exacerbations of pain and swelling in some of the larger joints, the application of blisters to the spine is of use.—*Lancet*, 1901, vol. clx. p. 998.

Treatment of Sciatica by Means of Spinal Cocainization.—DRS. P. MARIE and E. GUILLANI reported at the Société Médicale des Hôpitaux the case of a man, aged thirty-five years, who had suffered from an acute right-sided sciatica with well-marked and characteristic Lasègue's sign for eight days. Five-sixty-fourths of a grain of cocaine were injected beneath the spinal dura. Complete cessation of pain occurred within six minutes. The patient immediately arose and insisted on working. The pain recurred later in the day, but was less intense, and subsequently disappeared slowly. —*Gazette hebdomadaire de Medecine et de Chirurgie*, 1901, No. 27, p. 318.

DR. R. PULLS reports the results of the intraspinal cocaine injection for the relief of a case of sciatica of a month's duration. All the well-recognized procedures were unavailing. About twenty minims of a 2 per cent. solution were injected. Many of the accompanying effects were noted. Fever and herpes labialis were also noted. The analgesia persisted for twelve hours, but the severe pains of the sciatica did not return.—*La Riforma Medica*, 1901, No. 44, p. 150.

Chemistry of Ipecac.—DRS. B. H. PAUL and A. J. COWNLEY have been investigating the chemistry of this drug for a number of years. In their latest contribution to the study of the Brazilian variety they isolate three alkaloids—emetine, cephaeline, and psychotrine. The composition of emetine and cephaeline are comparatively well known. With reference to the new alkaloid, psychotrine, they find it in small quantities only, and it differs from these alkaloids in being sparingly soluble in ether. It is a crystalline body, melting at 280° F., and has a higher molecular weight than either emetine or cephaeline. It is readily soluble in alcohol or chloroform, the solutions becoming dark-colored on exposure to light and depositing a dark-brown substance. With reference to the pharmacology of the earlier isolated alkaloids it is well established that both emetine and cephaeline possess powerful emetic action, the emetic dose of emetine being double, however, that of cephaeline. On the other hand, the nausea produced by cephaeline is said to be double that occasioned by emetine. Cephaeline may be used in therapy in doses of from one-tenth to one-fifth of a grain as an emetic. Emetine is better as an expectorant.—*American Journal of Pharmacy*, 1901, vol. lxxiii. pp. 57, 107.

Treatment of Endocarditis.—DR. F. L. NEWMAN divides the treatment of this condition in two stages—the acute and chronic. In the vast majority of the acute cases an infection must be considered against which remedial agents are for the most part powerless. If of diphtheritic origin, serum-therapy offers some hope, and if of rheumatic causation the salicylates are indicated. Complete rest of the already restless heart is a necessity. In the sthenic cases four- or five-drop doses of tincture of aconite every three or four hours and small doses of morphine, especially if there be much pain, are indicated. Cardiac weakness is, however, the dominant note, and digitalis and strychnine are desirable to quiet the irregular heart action and embarrassment. Digitalis may be left with more propriety to the later stages of the affection. Local treatment by means of the ice-bag affords great relief. In the chronic cases it is not until symptoms of dilatation appear that any medicine should be given. Up to this time the patient with compensated valvular disease should be simply enjoined to be moderate in all things—his exercise, his food, his drink, his indulgence. He must be warned particularly against all sudden violent movements, as a sudden rush for the street-car or the rapid ascent of stairs; in fact, everything that subjects the heart muscle to sudden strain. Unfortunately, in many cases of endocarditis compensation can only be partially established, and the patient is constantly threatened with cardiac failure. For such an one very much can be done by proper attention to diet, hygiene, and medication. As soon as the alarm signal is shown by disturbance of the circulation, the patient should be put to bed and kept from all exciting influences until such symptoms have disappeared. Food should be given at short intervals (four meals a day) and in small quantities, so that the stomach will be thoroughly empty before the next meal. Large quantities of fluid, particularly at meals, are to be avoided, because they increase too suddenly the amount of fluid circulating in the bloodvessels. The medicinal treatment of failure of compensation is very often quite brilliant. The objection that digitalis is contraindicated in aortic regurgitation because the lengthened diastole allows more time for the blood to run back into the ventricle, the author believes. It is easy to see that in this manner such anæmia of the brain may be produced as to cause syncope or even sudden death; but even these dangers are lost sight of as the heart becomes more enfeebled and dilated, so that the mitral valves no longer close, and the resulting venous stasis and pulmonary embarrassment demand the administration of digitalis at all hazards. In all forms of cardiac dilatation from valvular lesions, therefore, a sheet anchor is digitalis. It is absorbed slowly and eliminated more slowly, so its action may continue for days. Strophanthus and strychnine are also indicated. Caffeine has a very uncertain, if any, action on the heart, but a very decided action on the kidneys. As a diuretic it is the most important of the heart drugs, and is, therefore, of the greatest value when there is renal suppression and dropsical effusion. Probably the most abused of the heart drugs are the nitrites. They are the most powerful reducers of blood-pressure known. They are vascular stimulants in the fullest sense. Nitroglycerin has no action on the heart, but decreases the resistance against which the systole is performed. For the palpitation the ice-bag, the belladonna plaster, and morphine are useful. The dyspnœa of heart disease has a cardinal remedy in nitroglycerin. Enlargement of the liver, beyond its treatment from the heart, can be benefited by an occasional dose of calomel or sodium phosphate, one drachm to three drachms *ter in die* in hot water. Bronchitis is largely relieved by the treatment of the heart, but occasionally codeine, morphine, or hydrocyanic acid will give relief. Anasarca should be treated promptly and the lymphatic spaces cleared. Puncturing with a large-sized needle, with all aseptic precautions, will often give the greatest relief to the patient, frequently with the disappearance of the symptoms of asthma, the œdema of the lungs, the palpitation, and other symptoms.—*Physician and Surgeon*, 1901, vol. xxiii. p. 120.

OBSTETRICS.

UNDER THE CHARGE OF

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Repeated Ectopic Gestation in the Same Patient.—LEWERS (*Transactions of the Obstetrical Society of London*, 1900, vol. xlii., Part 4) describes the case of a patient, aged twenty-nine years, who had two ectopic gestations. At the first the left tube was removed, containing a tubal mole.

The second ectopic pregnancy occurred a little more than six years later, and the right Fallopian tube and ovary and a tubal mole were removed. The ostium of the tube was widely open and the mole had been expelled into the peritoneal cavity and was lying loose at the ostium at the time of operation. The case was a complete tubal abortion.

Subcutaneous Symphysiotomy.—HERMAN (*Transactions of the Obstetrical Society of London*, 1900, vol. xlii., Part 4) reports three cases. He mentions four cases performed since this group, all of which recovered without complications. In his first patient alleged incontinence of urine persisted for some time after the operation. As examination showed no cause for this, and as the patient when not observed was not annoyed by incontinence, it was thought to be a nervous irritability only.

The method employed was, under antiseptic precautions, to open the symphysis subcutaneously and to deliver the head by forceps. In these cases the joint was opened by a tenotomy knife, which was inserted opposite the symphysis pubis, cutting at first down and then up. Considerable separation of the pubes occurred at the moment of delivery. After the operation the parts were kept in apposition by a strong binder of webbing or muslin.

A Probable Ovarian Pregnancy.—In the *Transactions of the Obstetrical Society of London*, 1900, vol. xlii., Part 4, **Croft** reports a case in which the signs and symptoms pointed to ectopic gestation. The sac and its contents were found entire and were removed by abdominal section. The patient died a few days after the operation.

On examining the specimen it contained a complete ovum and fœtus of about four months' growth, with placenta, membranes, and amniotic fluid. There was no blood or clot in the sac. The surface of the cyst contained follicles, and no separate structure corresponding to an ovary could be found upon that side. The microscopical evidence of ovarian tissue in the wall was uncertain. The Fallopian tube was present and uninjured, the fimbriated extremity was free and patent. The uterus was intact and the appendages on the opposite side were normal.

Cæsarean Section for Complete Placenta Prævia.—In the *Boston Medical and Surgical Journal*, February 14, 1901, **Hare** reports the case of a multipara with central placenta prævia, who was advised to go to a hospital for treatment. She declined, but sent for her physician some time later, when she was found to be having a very severe hemorrhage. The patient was finally brought to the hospital bleeding freely with a very rapid, poor pulse. The os admitted the finger-tip, and the placenta entirely covered the cervix. The child was living.

The patient was hastily prepared and at once delivered by Cæsarean section. The child weighed five and a half pounds and was resuscitated. The placenta was very large and was on the right and posterior side of the uterus. The small segment was attached to the opposite side, thus entirely covering the os. The uterus contracted well and was closed with two layers of interrupted suture of chromicized catgut. There was no bleeding from the uterus. The patient died eleven hours after the delivery of the child.

In the same journal **Dewis** reports a case of central placenta prævia in a multipara, seen when very much shocked by a severe hemorrhage. The patient was delivered by version, and was freely stimulated and seemed to react. She died with symptoms of embolism.

In the same journal **Coggeshall** reports a case of central placenta prævia in a multipara in labor who had been bleeding severely. The patient was given salt solution and strychnine, the cervix was rapidly dilated with considerable laceration, the placenta was separated and removed, and the child hastily delivered by version. The patient had stopped breathing, but was gradually resuscitated. The mother remained in an extremely critical condition for two days and finally recovered.

In the discussion upon these papers before the Suffolk Medical Society, the majority of opinion inclined to favor the Cæsarean operation whenever practicable.

Retroversion and Retroflexion of the Pregnant Uterus.—KEITLER reports from Chrobak's clinic in Vienna (*Monatschrift für Geburtshülfe und Gynäkologie*, 1901, Band xiii., Heft 3) a number of cases of retroversion and retroflexion of the pregnant uterus. He concludes that a backward displacement of the pregnant womb is an abnormality which may develop during pregnancy, and may not be the result of pregnancy occurring in a womb already retroverted. It is not uncommon to see the condition of retroversion become also retroflexion in these cases. They should, however, be distinguished, because both demand active treatment, and the exercise of force to secure replacement must be conducted with reference to the kind of displacement present. All cases of backward position of the uterus when the cervix is short and only the os remains are practically cases of retroversion if the mouth of the womb is directed anteriorly. Where the urine is retained the bladder must not be emptied entirely and suddenly, but very gradually. When bleeding from the bladder occurs it is evidence that necrosis of the mucous membrane has already begun.

In the *Transactions of the London Obstetrical Society*, 1900, vol. lxii., Part 4, SINCLAIR draws attention to irritability of the bladder as the symptom most constantly present in these cases.

In treatment Sinclair urges the introduction of a watch-spring pessary. The patient is made to lie upon her side with her face as far downward as possible; the uterus is restored to its place in a few hours. Sinclair has employed this method in fifteen cases in which it was universally successful. In one a fibroid tumor on the posterior wall of the uterus had fallen into Douglas' cul-de-sac and produced the symptoms of retroversion. This tumor was replaced by the pessary. Where the uterus is retroflexed and adherent, ventrofixation may be practised.

Repeated Ectopic Gestation.—In the *Annales de Gynecologie et d'Obstétrique*, March, 1901, VARNIER and SENS contribute a paper upon this subject. They have collected and examined the records of sixty-five cases, in which it seems probable that ectopic gestation occurred more than once in the same patient. They believe this to be more frequent than is usually supposed. As a rule, ectopic gestation recurs in the tube of the opposite side. In the sixty-five cases which they studied it recurred but once in the same tube. In forty-three cases the primary tubal gestation occurred sixteen times on the left side and twenty-seven times on the right. The interval of time elapsing between the second and first gestation was studied in fifty-six cases. In about one-third it varied from three to twelve months; in ten cases, from eighteen to twenty-four months; in eight cases, between two and three years, and in seven cases, between three and five years. In one case the interval was twelve years. In six cases out of the sixty-five an intra-uterine pregnancy intervened between the ectopic gestations. As regards the possibility of a third ectopic gestation in the same patient, it must be exceedingly rare, if ever observed.

An effort was made in this study to recognize conditions in the tube of the unaffected side which might predispose to ectopic gestation and to appreciate any cause other than local which might lead to this complication. In fifty-one cases forty occurred in multiparæ and eleven in nulliparæ. We should naturally expect that infection might leave in many cases alterations in the tubes predisposing to tubal gestation, but there seems to be no positive proof of this in the cases under examination. Enström describes a significant case in which the patient was treated for retroflexion, endometritis, and inflammation of the right ovary. After curettage and vaginofixation she became much better. A tubal pregnancy upon the left side followed, and at operation the right tube and ovary were found surrounded by very firm and dense adhesions. The fact that it is very difficult to determine positively by gross inspection at the time of operation that a tube is normal or diseased increases the difficulties in studying this question.

Abdominal Hysterectomy for Cancer at the Eighth Month of Pregnancy. —LEGUEU (*Comptes Rendus de la Société d'Obstétrique, de Gynecologie et de Pediatrie de Paris,* 1901, vol. iii.) reports the case of a multipara eight months pregnant with a rapidly growing epithelioma of the cervix. The vagina had not yet become involved. Free hemorrhage occurred which made it necessary to tampon the vagina and cervix. The cancer was curetted away from the cervix, to stop the hemorrhages. The mother's general condition improved, and she was submitted to operation by abdominal section. The uterus was then removed and drainage inserted, passing down through the vagina. The mother made an uninterrupted recovery. The child perished from inanition a few hours after birth.

Dystocia from Uterus Bicornis and Contracted Pelvis.—MCILWRAITH (*Canadian Practitioner,* February, 1901) reports a case of this unusual combination. The patient was a primipara who had been in labor some hours. The os admitted one finger; the cervix was not shortened. The presentation was difficult to outline, but the head was presenting and not fixed in the brim, and the back of the child was to the right. A mass of considerable size lay over the child's back, extending up to the right hypochondrium. This mass became prominent during uterine contractions, was doughy, not resonant, and the uterine souffle was heard over it very plainly. Labor proceeded in all thirty hours, with but little progress. The patient was then anæsthetized, the cervix dilated with the hand, and the occiput found posterior, but easily rotated. The internal antero-posterior diameter was found to be shortened. The patient was put in Walcher's position and an endeavor made to bring down the head by pressure. This failed, and the child was delivered by version and resuscitated. On introducing the hand to remove the placenta a septum was found extending about one-third of the distance down the interior of the uterus. The placenta had been adherent in the right cornu and the breech of the child had occupied the left. The mother made a good recovery.

Cæsarean Section for Fibrocystic Uterine Tumor.—BRODHEAD (*The Post-Graduate,* March, 1901) describes the case of a primipara having had a normal pregnancy and having a slightly contracted pelvis. On vaginal examination a tumor the size of an orange was in Douglas' cul-de-sac, pressing the cervix forward behind the pubes. An effort was made to replace the tumor with the patient in the knee-chest posture, but this failed. At full term the patient was delivered by Cæsarean section. The tumor was found to have a pedicle. It was readily ligated, and the tumor was separated from the rectum and easily removed. The cervix was dilated by the finger from above and the uterus closed. The patient made a good recovery.

Epithelioma of the Cervix Complicating Pregnancy.—In the Dublin *Journal of Medical Science*, February, 1901, KINKEAD reports the case of a multipara, eight months pregnant, having a tumor the size of a hen's egg attached to the anterior lip of the uterus by a broad pedicle. As the tumor was bleeding freely, it was removed by the curette and iron applied to the stump with a vaginal tampon. The patient recovered from the operation and was subsequently delivered of her child. She returned to the hospital, and the cancerous mass was removed from the cervix by incisions and the parts closed with silkworm-gut. A few days after the uterus was removed through the vagina. Large vessels were found at this time and the tissues were exceedingly soft. Secondary hemorrhage occurred some hours after operation, which was checked by passing a ligature around the broad ligament, tamponing the vagina, and introducing salt solution under the breasts. In several hours hemorrhage returned and required the insertion of silkworm-gut suture at the right broad ligament and the application of a clamp. The patient slowly recovered, her convalescence being complicated by an abscess in the right iliac fossa. A strip of gauze was found which had been pushed high into the pelvis. The patient ultimately made a good recovery.

GYNECOLOGY.

UNDER THE CHARGE OF

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Pelvic Massage.—OLSHAUSEN (*Centralblatt für Gynäkologie*, 1901, No. 3) concludes an extended article on this subject as follows: Massage should only be applied to the treatment of firm pelvic exudates when evidences of acute inflammation have long been absent. It is important that the masses should be readily accessible to the finger-tips. Enlarged tubes should seldom be massaged, except in rare cases in which attempts are made to empty a hydrosalpinx into the uterus.

In massaging thickened tubes the manipulation should be directed principally to the surrounding exudate.

Massage is contraindicated in the case of peritoneal adhesions, hæmatocele, and displacements of the uterus and adnexa.

Origin of Dermoid Cysts from Wolffian Bodies.—BANDLER (*Archiv für Gynäkologie*, Band lxi., No. 3) supports the theory that ovarian dermoids develop from the Wolffian bodies by reference to the fact that the epithelium of the Wolffian duct is derived from the ectoderm. He even goes so far as to affirm his belief that cystoadenomata of the ovary arise from the primordial kidneys, the tubules of which penetrate not only the hilum but the stroma of the gland. He explains the development of mixed tumors on the theory that they arise from ingrowths from the Wolffian bodies, which, on account of the prevalence of hair and skin, are recognized as dermoids.

Changes in the Endometrium due to Sclerosis of the Uterine Arteries.—SIMMONDS (*Centralblatt für Gynäkologie*, 1901, No. 3) calls attention to the frequency with which minute hemorrhages are observed in the uteri of old women. These are associated with venous thrombosis, sclerosis of the arteries, and narrowing of their lumina. The hemorrhages probably occur just before death, being due to weakened heart action, and have no clinical significance. Since these sclerotic changes are common between the ages of forty and fifty, it is fair to infer that in many cases climacteric hemorrhages are also due to this cause. Such a condition of the vessels was found by the writer in the uterus of a woman, aged fifty-four years, which was extirpated on account of obstinate bleeding, the cause of which could not be discovered.

Gynecological Operations in Diabetics.—LOMER, in a paper on this subject read before the Hamburg Obstetrical Society (*Centralblatt für Gynäkologie*, 1901, No. 3) reports a case of curettement for repeated hemorrhages in a patient whose urine at the time of the operation contained only one-tenth of 1 per cent. of sugar. Immediately after the operation 4¾ per cent. appeared, and the patient died a few days later in coma. He calls attention to the fact that in diabetics who have been weakened by loss of blood gynecological operations are especially dangerous. On the other hand, in glycosuria accompanied by obesity, amenorrhœa and pruritus the danger of coma is much less. In the discussion which followed Räther stated that he had frequently operated upon diabetics without bad results; in fact, he estimated that not less than 1 per cent. of gynecological patients had sugar in the urine. Kümmell agreed with the speaker, and believed that the unfortunate result in the case reported should be regarded as exceptional. Others emphasized the importance of testing the urine for sugar before every gynecological operation, and the dangers attending anæsthesia in diabetic patients.

Observations on Gonorrhœa in Prostitutes.—PROME (*Centralblatt für Gynäkologie*, 1901, No. 3) reports the results of the systematic hospital treatment of prostitutes in San Salvador, where the opportunities for the study of venereal diseases are apparently unequalled. Out of 407 patients 313 had gonorrhœa. The writer affirms that it is not easy to recognize gonorrhœal endometritis at its inception. Enlargement and tenderness of the uterus, with accompanying amenorrhœa, gastric disturbances, etc., point to the extension of the infection from the vagina. The adnexa were affected in 68 per cent. of all cases, 5 per cent. showing acute salpingitis; 81 per cent. were sterile.

The writer notes that nulliparæ with anteflexed uteri seem to be less prone to disease of the adnexa, and explains this on the theory that the atonic uterus in these cases does not contract at the height of the orgasm, and thus favor the draining up of gonorrhœal discharges into its cavity.

Experiments showed that infection was not produced by the contact of gonorrhœal pus with intact epithelial surfaces. Moreover, the presence of a few gonococci in the vaginal secretions of prostitutes is no proof of its infectiousness.

The writer favors curettement in acute infection of the endometrium, as a timely resort to this operation sometimes prevents extension to the tubes. In twenty subacute cases curettement caused the disappearance of exudates, and the emptying of a pyosalpinx into the uterine cavity (?), although the relief was usually only temporary. Reinfection of a patient who was discharged from the hospital as cured was rarely observed.

Sarcoma of the Cervix Uteri.—BORRMANN (*Zeitschrift für Geb. u. Gyn.*, Band xliii., Heft 2) reports the case of a patient, aged thirty years, who died of sepsis following abortion at the fourth month. At the autopsy he found a giant-celled sarcoma of the cervix, with metastases in both ovaries and the pelvic lymph glands and vessels. Although the ovaries were enlarged to the size of the fist, a corpus luteum of pregnancy was found in the centre of the tumor on the right side. He inferred that the metastases were favored by pregnancy.

Uterine Fibromyoma Complicated with Diabetes.—KLEINWACHTER (*Zeitschrift für Geb. u. Gyn.*, Band xliii., Heft 2) reports two cases, four only having previously been recorded in the literature. In his cases, unlike the others, the tumor was small, the hemorrhages slight, and the percentage of sugar was low.

Thrombosis and Embolism Following Hysteromyomectomy.—BURCKHARDT (*Zeitschrift für Geb. u. Gyn.*, Band xliii., Heft 2) met with twelve cases (six fatal) in the course of 236 operations. Œdema of one or both of the lower limbs was noted as the principal indication of thrombosis in one-half of the cases. Mahler's sign was present in eight; on the other hand, this phenomenon was noted in cases which presented no other evidences of venous thrombosis.

Diagnosis of Cancer of the Body of the Uterus.—HANDFIELD-JONES (*British Medical Journal*, January 19, 1901) summarizes as follows: 1. Cancer of the body of the uterus is preceded by a stage of benign adenoma. 2. The microscopical examination of tissue obtained by the curette is apt to be misleading in the early stage of the disease, since the superficial epithelium alone is removed and not the glands. 3. Hence, clinical evidence is more useful than microscopical. 4. There is a wide variation in the degree of malignancy. 5. Rapid enlargement of the uterus is the most positive indication for hysterectomy.

OTOLOGY.

UNDER THE CHARGE OF

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Persistent Retroauricular Opening after Radical Operations and Subsequent Plastic Closure.—F. TRAUTMANN (*Archiv f. Ohrenh.*, vol. xlvii.) favors persistent retroauricular opening after the radical operation as the best means of carrying on the treatment necessary to bring about epidermization of the new formed bone cavity. Treatment for this purpose carried on by means of tampons of sterilized gauze, through the auditory meatus alone, is very painful to the patient and unsatisfactory to the surgeon. In performing a radical operation on the mastoid antrum and middle ear cavities, involving removal of the posterior wall of the auditory canal, Trautmann makes the first retroauricular incision ¾ cm. behind the insertion of the auricle. The soft tissues with the periosteum of the mastoid are pushed back and the surface of the bone fully exposed, and the cutaneous auditory canal, along its upper, posterior, and inferior wall is removed by a raspatory from the bony canal. If the remnant of the membrana tympani is large its excision must be performed with a small knife. Further operation on the mastoid and posterior wall of the bony canal must depend upon the apparent position of the sinus. If the latter lies far forward, as it does in a narrow, high mastoid, the bone must be opened first at the attic and aditus, the malleus and incus, and granulations removed, and the surgeon must then pass backward toward the antrum by careful removal of thin lamellæ of bone. If the mastoid is flat and wide, the sinus lies far behind, and then the antrum may be opened at once, and the surgeon pass forward into the attic, by removal of lamellæ of bone, and remove the malleus, incus, and granulations. After the new bone cavity has been fully made the cutaneous auditory canal is transplanted. This is important as regards the persistent retroauricular wound. The splitting of the posterior wall of the cutaneous canal and the formation thus of the so-called cutaneous flaps for lining the inner and posterior wall of the new formed bony cavity are best accomplished, according to Trautmann, by inserting a species of director, made by having a groove in the handle of a cotton holder thick enough to nearly fill the cutaneous canal. This groove in the director is placed so as to run on the upper posterior wall of the canal. Here the incision is made so as to form an upper narrow and a lower broad flap. The incision is carried 5 mm. into the skin of the concha, the skin pushed away from the cartilage, and at the end of the canal incision, an incision made at right angles to it, close to but not through the cartilage of the concha. Thus two rectangular skin flaps are formed. The lower one is stitched into the lower angle of the mastoid wound, but not at its most external limit, and the upper flap, the narrow one, is tamponed into position in the upper part of the bone cavity. Then the upper and lower angles of the wound are brought together with one or two sutures. The edges of the auricular wound are allowed to heal by granulations in Trautmann's operation. By this means the retroauricular wound is rendered somewhat smaller by reason of shrinkage and epidermization. The incisions carried into the concha in this method enable the surgeon by tamponading to widen the meatus somewhat without deforming it, and to carry on some of the treatment with tampons through the widened meatus. The tampons consist of acetate of aluminium gauze. These are allowed to remain as long as possible in position. If the dressings become moist in spite of the acetate of aluminium gauze, then 10 per cent. xeroform (tribromo-carbolate of bismuth) gauze may be tried. Xeroform gauze gets black by the decomposing effects of the pus, but as the suppuration diminishes the discoloration of the xeroform lessens, and serves as an indication of the decreasing suppuration. Iodoform gauze is not used by Trautmann, because it irritates the skin, especially in children. If the insertion of the tampons is painful the wound may be dusted with orthoform, which seems to lessen the pain in most cases. Epidermization proceeds slowly in chronic cases, in which the mucous membrane is infiltrated and hyperæmic and chronic nasal catarrh is present. Constitutional taints exercise a disadvantageous influence on healing and must receive a general medication. Epidermization is aided by skin grafting after Thiersch's method. In some cases secretion occurs in the finally epidermized cavity, in connection with acute nasal catarrh. Such processes can be healed by simple dry treatment. Those cases epidermize most quickly in which the caries is limited to the hammer and anvil, with nothing more than granulations in the attic, aditus, and antrum, and without complications and constitutional disorder. Also cases of cholesteatoma without complication quickly epidermize. After complete healing superficial suppuration may occur in the new epithelium. This can be prevented by applying to the bony cavity once a week a thin layer of ointment of the white precipitate of mercury in sterilized vaseline (2 per cent.), and then packing this cavity loosely with sterile gauze. If the tympanic mucous membrane is not swollen at the outset, healing occurs with conservation of all the delicate contours of the inner wall of the drum cavity, excepting the stapes. This is rarely seen after healing of the wound of the radical operation, as its niche is covered with new epidermis that greatly interferes with its mobility and visibility.

If the mucous membrane is swollen before the operation it remains after the operation, thickened by increase in connective tissue. There exists, however, a narrow opening in this new thick tympanic wall communicating with the Eustachian tube. Through this there may be an escape of mucus upon the occurrence of an acute nasal catarrh.

Trautmann states (*loc. cit.*, p. 6) that galvano-cauterization of the edges of this opening followed by firm tamponade against the labyrinth wall or inner wall of the drum cavity will effect its closure. He also says that galvano-cauterization of the pharyngeal mouth of the Eustachian tube will not prevent communication between the middle ear and the nasopharynx. Sometimes there is found a new membrane having the appearance of a new membrana tympani. This is not formed from the remnant of the old membrane, however, but is a neoplastic connective tissue membrane.

In the region of the aditus and attic repullulating ganulations easily form and prevent epidermization. If these granulations are allowed to remain in position without proper treatment they may become organized and covered with epidermis so that healing has apparently occurred; but beneath such granulations suppuration will continue. Therefore, these granulations must be removed and their occurrence prevented. Their presence by incarcerating the stapes interferes greatly with any hearing that may remain. Tamponade widens the auditory canal and new formed bony cavity, but the canal narrows again after the tamponade is left out. Narrowing also takes place in the retroauricular wound, in some cases almost to closure of the same. The average depth of the new-formed cavity varies in children up to fourteen years of age from 2½ cm. to 3 cm.; in adults from 3½ cm. to 3¾ cm. The average diameters, vertical and transverse, of the retroauricular opening, both in children and adults, are about the same, and amount to from 1 cm. to 1.5 cm. Whether and when the retroauricular opening is closed by a plastic operation depends upon, first, the patient, and, secondly, upon the nature of the malady inducing the operation, and, thirdly, upon the healing process.

The long continued treatment, necessary to induce healing of the middle ear cavities, renders most patients unwilling to undergo even a short second operation for plastic closure of the wound behind the auricle. This wound should not be closed until definite healing has taken place. If cholesteatoma was the reason for the operation the retroauricular opening should not be closed. If it is decided to close the opening behind the auricle it is advisable not to do this until at least a year has elapsed from the time of the original radical operation.

DISEASES OF THE LARYNX AND CONTIGUOUS STRUCTURES.

UNDER THE CHARGE OF

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Foreign Bodies in the Larynx.—DR. A. W. DE ROALDES reports (*New York Medical Journal*, October 6, 1900) a case of a pin in the larynx of a child nine years of age which had been swallowed two years previously and which he removed by endolaryngeal procedures.

Thyroid Tissue in the Larynx and Trachea.—DR. OTTO T. FREER reports (*Journal of the American Medical Association*, March 30, 1901) a case of this rare condition, stated to be the tenth on record. The patient was a woman, aged thirty-two years, who had had attacks of hoarseness every second or third winter from childhood. After a hoarseness of several weeks suffocation and wheezing paroxysms occurred for the first time and recurred during subsequent attacks. The larynx was found normal down to the true vocal bands, but just below them was a protruding ledge of tissue forming an irregular ring with much the contour of a second pair of vocal bands below the true ones. The thickening extended along the trachea for three or four rings, having a prominent tumor projecting from the posterior wall. Palpation showed almost complete absence of the thyroid gland. An attempt at destruction of the tissue by electrolysis was followed on the second day with tumefaction to such an extent as to render immediate tracheotomy necessary. A portion of the growth on the posterior wall of the trachea was subsequently removed with the wire snare and forceps, and when examined under the microscope proved to be typical thyroid tissue. The patient refused operative measures by access from without, and was content to live with her tracheotomy tube in position.

Angioma of the Larynx.—In the course of an article upon this subject, Prof. SEIFERT, of Wurzburg, reports (*Revue hebdomadaire de Laryngologie, d'Otologie et de Rhinologie*, January 12, 1901) a case of this rare neoplasm in a man, aged fifty years. The growth occupied the anterior commissure of the glottis, its surface of insertion extending as far as the subglottic region, rendering removal of the tumor, which was accomplished with forceps, rather difficult. Hemorrhage was considerable, but became arrested at the end of ten minutes after the patient had swallowed a great deal of ice. The voice immediately became clear and recovery was uninterrupted.

MR. A. J. BRADY reports (*Journal of Laryngology, Rhinology, and Otology*, January, 1901) an angioma the size of a cherry below the anterior commissure of the vocal cords of a lad, aged six years. Several attempts at operating under cocaine were made without avail, even after a whole month's training. Under chloroform, and drawing the tongue forward with a Kirsten tongue depressor so as to expose a view of the upper portion of the glottis, though not of the growth, the latter was successfully removed with a Heryng's laryngeal curette with but slight hemorrhage, some remnants being removed in a similar way ten days later.

Emphysema of the Upper Eyelid from Nasal Lesions.—PROF. BEAMAN DOUGLASS, of New York, discusses this subject (*New York Medical Journal*, March 23, 1901) and reports four cases of his own, two of which occurred in immediate sequence to operation upon the ethmoid bone and two independently of operation.

The emphysema of the upper eyelid is regarded as probably due to perforation of the wall of the orbit near the middle, whence the air at once enters the space between the orbital periosteum and the first fascia of the eyeball. The subject is discussed by the writer in several aspects, especially the medico-legal one, concerning which he concludes that the surgeon is not at fault for emphysema following operation. Nevertheless, he comes to two important conclusions: First, that the curette should be avoided as much as possible, for he believes that it is the curette that is responsible for much of the traumatism occurring to the lamina papyracea. Much better work can be done with the alligator forceps or some kind of cutting forceps which is less apt to perforate, and which will, with equal success, drain pus or remove polyps as well as the mucous membrane lining the ethmoid cells.

His second rule is never to amputate any part of the middle turbinate, as it forms a very important guide along which an operation may be carried out without risking entrance either in the orbit or brain cavity in operations on the ethmoid. Finally, the statement is made that abscess, destruction of the eye, and possible meningitis may arise from septic conditions in operations carelessly done upon the ethmoid bone.

[Dr. Douglass' warning is quite justifiable, for the compiler is aware of fatal meningitis following what was described as merely exploratory procedures in the region of the ethmoid cells.]

A New Method of Extirpating Growths from the Larynx of Children.—DR. MOUSELLES, of Florence, extols (*La Semaine Méd.*, December, 1900; *Revue hebdomadaire de Laryngologie, d'Otologie et de Rhinologie*, March 16, 1901) a device of his own which consists in inserting an O'Dwyer intubation tube, fenestrated toward its lower extremity, and scraping the larynx through the aperture. The tube can be turned in any direction while remaining fixed to the introducer.

Removal of a Foreign Body Through the Bronchus by Intrathoracic Tracheotomy.—MR. H. MILTON (*The Lancet*, January 29, 1901) performed this operation upon a man, aged forty years, for removal of a tubular portion of a tracheal canula which he had been wearing for some years on account of syphilitic stenosis of the larynx. The sternum was exposed, sawed through vertically in the middle line, and the fragments separated by powerful retractors. The trachea was pulled upward with a hook so as to expose the bifurcation, above which an incision was made. The little finger when inserted into the right bronchus impinged upon the foreign body, which was eventually removed with forceps guided along the finger. Unfortunately, the case terminated fatally, in consequence of pre-existing sepsis.

The method of performing this operation and the after-treatment are discussed in detail.

Post-influenzal Tracheal Hemorrhage.—MR. JAMES DONELAN reports (*Journal of Laryngology, Rhinology, and Otology*, January, 1901) five cases, and alludes to four others, the diagnosis resting principally upon the detection, under laryngoscopic inspection, of more or less blood upon the wall of the trachea.

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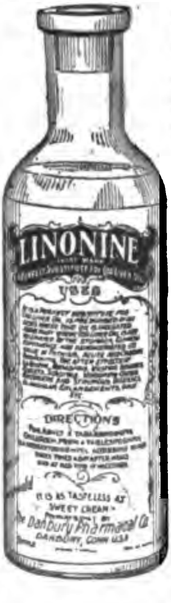

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ANÆSTHETICS IN HEART DISEASE.[1]

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"In every case in which an anæsthetic is to be administered there are three factors which contribute each an element of uncertainty to the result:

"1. The special action of the agent employed.

"2. The peculiarities or idiosyncrasies of the patient as to susceptibility.

"3. The skill with which the agent is administered."

These words of Sir George MacLeod, spoken some years ago in a discussion on anæsthetics before the Medico-Chirurgical Society of Glasgow, apply with peculiar force to the subject which we are about to discuss.

I wish to make acknowledgment here of my indebtedness to Drs. Tinker, Dabney, Brown, and Pancoast, who, with no little labor, have compiled the statistics for me from the records of the Johns Hopkins Hospital, the Union Protestant Infirmary, and also Dr. Kelly's private sanatorium, which he kindly placed at my disposal.

The literature upon the subject of anæsthetics in general, and their effects, physiological and pathological, upon man and the lower animals, is very voluminous. Carefully recorded observations with reference to the particular effects these anæsthetics have been observed to produce in patients suffering from lesions of the heart are correspondingly meagre.

Much speculation has been indulged in by some writers as to what would take place if certain anæsthetics were administered in certain impaired conditions of the heart, and not a few dogmatic statements are to be found here and there setting forth the dire calamities which are sure to befall, and that speedily, the luckless surgeon who dares to administer, it may be, chloroform to a weak anæmic patient with a dilated uncompensated heart, or perhaps ether to a plethoric arteriosclerotic with aortic insufficiency. And yet every now and then, in cases of emergency of one sort or another, it falls to the lot of every surgeon to be compelled to administer an anæsthetic to a patient suffering from some serious heart lesion; and one never undertakes such an operation without misgivings.

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[1] Read before the College of Physicians of Philadelphia, May 1, 1901.

But that patients exhibiting to a marked degree those conditions supposed theoretically to contraindicate the administration of chloroform will, and do, take it frequently without a single symptom from start to finish—that is, of sufficient gravity to excite a moment's apprehension in the mind of the anæsthetizer—is the common boast of the champions of chloroform. Likewise, the advocates of ether will insist that all classes of patients afflicted with any variety of heart lesion will, as a rule, bear ether well. The weak are stimulated by it, and others —"well," they say, "at any rate, I have never seen it do any harm, and I have given ether to thousands of cases." While the advocates of cocaine will tell you that in the form of Schleich's or other weak dilutions it can be used *ad libitum* in patients afflicted with any form of heart disease without the slightest risk. And so it goes.

It is a waste of time to quote the statistics of Gurlt, von Bardeleben, or the report of the "British Anæsthetics Committee," as to the relative safety of ether and chloroform, to the man who was brought up on chloroform, has never used anything else, and who has been so fortunate as never to have lost a patient therefrom. According to this man, fatalities are always the result of either faulty administration or failure upon the part of the administrator, in case of the appearance of alarming symptoms, to apply proper remedies. "He neglected to suspend the patient, or to induce artificial respiration; to produce traction upon the tongue, or to dilate the sphincter; to give cardiac massage," or what not. And nothing can convince the ether enthusiast that the long list of possible complications and occasional casualties that may and do now and then happen, both during and after ether, are caused either by the improper administration of the drug or by neglect upon the part of the attendants to properly protect the person of the patient from exposure to cold and chilling draughts while under the influence of the anæsthetic.

I have found very few careful and satisfactory observations recorded, showing deleterious effects of anæsthetics in heart disease. A study of the fatal cases is of very little assistance, because it will be found at once that but a very small proportion of these cases were known before-hand to have had a cardiac lesion, and the absence of organic heart disease has been proven in a large majority of those cases that have come to autopsy.

Ask the surgeon in active practice the question, "How many of your cases with a known heart lesion of greater or less severity have taken an anæsthetic badly or have exhibited alarming symptoms during the course of the anæsthetization?" I feel sure the almost universal answer would be, "Remarkably few." Indeed, the impression made upon my own mind, without reference to statistics, is that heart cases, so-called, bear ether (my experience has been confined almost exclusively to this anæsthetic) very well, and that the comparatively few cases which have exhibited alarming symptoms while under its influence were those with no evident heart lesion. Notwithstanding this wellnigh universal experience, I venture to say, however, that few careful surgeons undertake without misgivings an operation necessitating the use of a general anæsthetic in a patient the subject of organic heart disease.

It is the object of this paper to show, if possible, whether or not this impression existing in the minds of surgeons as to the comparative freedom from accident in patients suffering from heart disease, while under the influence of chloroform or ether, is well grounded; and if so, why? Is it because in cases with a known lesion the anæsthetizer is more careful to watch closely his patient's condition and be on the alert for the appearance of danger signals; in other words, to give that undivided care and attention to the administering of the anæsthetic to which there should never be, in any case, an exception?

It is a well-known fact that the fatalities under chloroform and ether and the bad effects following them occur much more frequently in the hands of the inexperienced or reckless anæsthetist than in those of the expert. And if it is true that heart cases take anæsthetics no worse than normal cases, why should this deep-rooted fear exist in the minds of surgeons as to the danger of giving anæsthetics to such patients?

Let us first note what are the physiological effects of these anæsthetics upon the normal heart. This having been determined upon, are these effects modified by the conditions found present in the different heart lesions?

Anyone who has had wide experience in the administration of anæsthetics must have been struck with the fact that the degree of narcosis and of danger is not indicated by the actual amount of the anæsthetic used, but by the concentration of the vapor inhaled, since one patient may in the course of a long operation inhale a large amount of chloroform without trouble, while another patient may be thrown into a condition of extreme danger by the inhalation of the concentrated vapor of a few drops. Physiologists tell us, and these conclusions have been accepted by most clinicians, that the effect of the two principal general anæsthetics—chloroform and ether—is practically the same up to a certain point. Their effects, in brief, upon the normal individual are as follows: The pulse, often accelerated before the operation, owing to fright and apprehension, may be still further quickened during the first and second stages of narcosis, although at times it shows some slowing, the effect of reflex stimulation. The deeper the anæsthesia the slower and weaker becomes the pulse; in profound anæsthesia it may be very weak. The tension and rate of the pulse are not so much affected by ether as by chloroform. The margin between a percentage of concentration of chloroform vapor necessary to produce anæsthesia, and one likely to produce dangerous results upon the respiratory centre and heart is much smaller than in the case of ether. This is the chief reason why ether is the safer anæsthetic, and why careless and unskilful anæsthetization is so dangerous.

The respiration is not much altered during the first stage. In the second, owing to excitement, it may become irregular and voluntarily suspended for a longer or shorter time, and then deep and rapid inspirations are frequently observed. This is the most dangerous period. Owing to the possibility of a large amount of concentrated vapor being suddenly inspired, the heart may be so injured as to be unable to carry on the circulation. This is the usual cause of sudden death in the early stages of the administration. Later the respirations become shallower and slower, and occasionally in long operations extremely weak and irregular. The respirations under chloroform, as a rule, are less deep than under ether, and the circulation is thus afforded less aid from the respiration.

The action of these two drugs on the respiratory centre seems to be partly direct and partly indirect. The slowing or temporary arrest of the respiratory movements, sometimes noticed in the first stage of narcosis, are ascribed to a reflex action set up by the irritation of the terminations of the trigeminus in the nose and throat, and of the pneumogastric in the larynx and bronchi. But this is of minor importance, except on account of the following deep inspirations which may lead to the inhalation of a dangerous dose of the anæsthetic if it is pushed at this time. In the third stage direct action of the drug on the respiratory centre is manifested in slow and shallow breathing. If the drug is pushed these effects are increased until finally the respiratory centre becomes paralyzed. And now, although artificial respiration be energetically applied, it often fails, because the heart has become so dilated and the blood pressure so low that the vital centres are so poorly nourished that they can no longer perform their functions, and particularly is this so with chloroform. The effect of chloroform upon the circulation is more rapid and more powerful than ether. They both produce at first a slight rise in blood pressure due to reflex action on the vasomotor centre; later, however, a fall in blood pressure is observed with a slowing of the heart's action, and if the anæsthetic be pushed there is a marked fall in blood pressure and the heart stops beating. This result is probably due to either weakness of the heart or paralysis of the vasomotor centre, probably more often the former. Under a moderate degree of chloroform narcosis the heart may become considerably dilated, while under the same grade of ether narcosis it generally remains unimpaired, and rarely becomes dilated until shortly before respiratory paralysis occurs. Fatty degeneration has been noticed in the heart and other organs after chloroform administration, and if marked may lead to heart failure. This degeneration is so slight in ether that it is of no significance.

"Chloroform is from three to four times as depressant as ether to the central nervous system, while its action on the heart is nearly fifty times as great," says Cushny. Ether, since it has to be given in more concentrated vapor, is more irritating to the air-passages, and hypersecretion of mucus, vomiting, etc., are consequently more marked.

As to the actual cause of death, physiologists still differ, but the weight of opinion seems to be that, except in rare instances, respiration fails before the heart. As Cushny has well said, "From a practical point of view it is of comparatively very little importance whether there are a few fluttering beats of the heart after the last inspiration or not. The all-important question is whether the heart has been so injured as to be unable to carry on the circulation, and this is decided by the concentration of the vapor that has been inhaled."

From this it would appear that the most important point in the administration of an anæsthetic, particularly chloroform, is to be sure that the degree of concentration of the vapor inhaled should never reach beyond a certain percentage, say 3 or 4 per cent., while with ether it may be safely carried much higher. It is well to watch the character and rate of the pulse, but of far more importance to watch the respiration for the earliest indications of danger. Bear in mind, then, the action and effects, physiological and pathological, above enumerated, and the uncertainties attending the use of these agents in a normal individual, and then apply them to the various forms of heart lesions met with, and a very ready explanation is at once offered for the deep-rooted prejudice referred to in the beginning of this paper as existing in the minds of surgeons against administering an anæsthetic in certain of the graver forms of heart disease. One can readily understand how in the hands of the skilled anæsthetist a patient suffering from a mild grade of even the severer forms of heart lesion may take the anæsthetic without exhibiting to the slightest degree alarming symptoms. On the other hand, the possibilities for trouble that suggest themselves in the course of the prolonged administration of an anæsthetic in the case of an individual exhibiting signs of a grave heart lesion are truly appalling. No wonder, then, that the careful surgeon shrinks from exposing his patient to such risks until compelled to by the exigencies of the case.

Heart disease does not of itself contraindicate the administration of chloroform or ether, but it would appear that their administration in the presence of certain lesions is attended with greater risks than with others, and that in certain impaired conditions of the heart the one is to be preferred to the other; for instance, in fatty degeneration of the heart, in fact in all pathological myocardial changes, if at all advanced, it is evident that the cardiac and circulatory changes produced by ether might be attended with some risk, but that chloroform, on account of its greater liability to produce fatty degeneration of the heart muscle, would be especially dangerous.

Since the general effect of ether upon the circulation is that of a stimulant, no class of cases seems especially prohibitive, the contraindications to its use being respiratory rather than cardiac. In aortic disease its effect may be apparently beneficial as well as in slight uncompensated mitral affections. I have myself observed recently in a case of aortic insufficiency the murmur all but disappear and the heart's action improve markedly under the stimulation of ether, as I have in one instance at least, observed a mitral systolic disappear completely while under ether, to reappear later after the effects of the anæsthetic had worn off.

It is a cause for wonder that sudden death, relatively so common in heart disease, is not of more frequent occurrence in connection with anæsthesia by whatever agent produced, associated as it is with so many elements calculated to profoundly disturb both the mental and physical equilibrium of the patient, and that this is true, considering to what an enormous number of cases, many of whom are weak and diseased, anæsthetics are being continuously administered, and how few deaths result therefrom, the extraordinary safety of these agents can be the better understood. Cases of sudden death from one cause or another during anæsthesia are, however, to be found scattered here and there through the literature.

Paralysis, arrhythmia, tachycardia, and bradycardia have all been noted as occurring during the course of anæsthesia, due, undoubtedly in some instances, to organic and in others to functional disturbances.

In studying the reports of fatal cases one cannot but feel that in a certain proportion of them at least death was due either directly or indirectly to the violation of some one or more of the cardinal principles underlying the proper administration of an anæsthetic, hence we cannot but emphasize here the especial necessity in all cases of heart lesion of observing the rules formulated from the combined experience, clinical and in the laboratory, of many observers during the half century of anæsthetization.

Brunton has very well said, " A man is not a horse because he happens to be born in a stable, neither is a death necessarily due to an anæsthetic because it happens to occur during anæsthesia." There are certain well recognized causes of death independent of the shock resulting from the effects of the operation itself, such as hemorrhage, injury to nerve structures, etc. Mikulicz has called attention to the great importance of blood examination in anæmic patients before operation in order to determine the percentage of hæmoglobin. It has been shown by this observer and the reports of other later writers that in all patients having a hæmoglobin percentage of 50 or less the anæsthetic may produce dangerous results, shock and collapse being very pronounced. When the hæmoglobin is under 30 per cent. the administration of an anæsthetic is attended with grave risk. An interesting case in point is reported by Bloodgood. Interesting observations, although somewhat conflicting, have been made by J. C. Da Costa, von Lerber, and others as to the effect of the anæsthetic upon the red blood-corpuscles themselves. Deaths from fright at the very beginning, or even actually before the inhalation of the anæsthetic vapor has been begun, have been reported. Anxiety and fear are cardiac depressants and may produce dangerous or even fatal symptoms from heart failure.

I have not the time, nor is this the place, to enumerate and discuss all of the principles referred to, but I will, by way of emphasis, indicate a few of the more important in connection with diseases of the heart. It, of course, goes without saying that the usual preliminary preparation, such as fasting, cathartics, removal of foreign bodies from the mouth, etc., should have been attended to before the anæsthetic is begun. The frame of mind in which the patient approaches the anæsthetic is of great importance, and the anæsthetizer should make it a part of his duty to reassure the patient and gain his confidence as much as possible before actually applying the anæsthetic. I am sure that anyone of any considerable experience must have noticed the quieting effect of a few reassuring words upon a nervous patient. I shall say nothing as to the particular mode of administering the anæsthetic. Each anæsthetizer has his favorite inhaler, and each, as a rule, can do better work with that particular one to which he has become accustomed. For myself I prefer a simple cone.

Laborde, Rosenberg, and others have advocated strongly the preliminary application of solutions of cocaine to the nasopharynx in order to lessen as much as possible the reflex action of the anæsthetic upon the terminal endings of the trigeminus, and thus lessen the danger of sudden cardiac syncope. The claims of these writers, however, seem hardly to be supported by other more recent observers.

In selecting the particular anæsthetic which one shall use, whether chloroform or ether, the majority of operators will be governed more perhaps by habit and previous training than by any other factor. Still, there are certain conditions which ought to influence the selection of the anæsthetic, for instance, as a rule, in all cases of weak heart, from whatever cause, chloroform is the more dangerous. It is more dangerous, too, in very nervous apprehensive patients, in kidney diseases, etc., while ether in acute lung affections and alcoholics is more dangerous probably than chloroform.

The physical characteristics and temperament of the patient exert no inconsiderable influence upon the way he takes the anæsthetic. The vapor of ether is so irritating to the mucous membranes of some patients, and the secretion of mucus and saliva resulting therefrom so excessive, that there is actual danger of the patient drowning in his own secretions. Short, thick-necked, fat-jawed, florid men, particularly if of alcoholic habits, are notoriously bad subjects for ether.

Among the other dangers to which the patient is subjected one may mention the beginning of the operation, during the stage of incomplete anæsthesia. This danger is more pronounced in chloroform than in ether, because of the additional inhibiting effect of pain upon the heart's action. Complete anæsthesia is indicated particularly in cases of shock.

The two greatest dangers to be guarded against are impeded respiration and the administration of too concentrated vapor. In overcoming the former the effect of the position of the patient, the pressure from tight clothing, arms, assistants, weight of instruments, dropping back of the tongue, mucus and foreign bodies in the throat, etc., must all be considered. The skill and experience of the anæsthetizer is of far more importance in preventing the latter than any special form of inhaler.

That the personal equation of the anæsthetizer plays an important rôle in the effect of the anæsthetic upon the patient is very well illustrated in a case of my own:

A middle-aged man was anæsthetized six times in the course of two years by six different anæsthetizers. The length of time of the anæsthetic and the operative procedures in all cases did not vary much, and his general condition, mental and physical, remained practically unchanged. At the first anæsthetization it took one hundred and twenty grammes of ether and eighteen minutes to produce surgical anæsthesia. From the beginning to the end of administration was one and a half hours. Total amount of anæsthetic used, three hundred and ten grammes. Pulse range, 98 to 122.

At the second operation it took one hundred and twenty grammes and fifteen minutes to anæsthetize. Total amount of ether, three hundred grammes. Pulse range, 90 to 132.

Third, five hundred grammes to anæsthetize and twenty-five minutes to produce surgical anæsthesia. Total, one thousand grammes in one and a half hours. Pulse ranged between 92 and 100.

Fourth, one hundred grammes to anæsthetize in twelve minutes.

Total amount, two hundred and seventy-five grammes in one hour and forty-five minutes. Range of pulse, 85 to 142.

Fifth, one hundred and fifty grammes in fifteen minutes. Total amount, four hundred and fifty grammes in one and a half hours. Pulse range, 90 to 125.

Sixth, two hundred grammes in fifteen minutes to anæsthetize. Total amount, five hundred grammes in one hour and ten minutes. Pulse range, 100 to 160.

When signs of danger appear remedial measures suitable to the indications are to be instituted at once. These vary of course with the nature of the trouble. If respiratory failure, artificial respiration must be begun, and if the trouble has come on early in narcosis, the chances of a successful issue are greater than in the later stages.

Here as elsewhere prevention is far better than cure. I firmly believe that the majority of so-called accidents occurring both during and after anæsthesia, from either chloroform or ether, are entirely preventable; that when they do occur it is due to the carelessness or ignorance of the anæsthetist in not properly watching the effect of the anæsthetic upon his patient—and hence, not being quick to act upon the suggestions offered by the symptoms—rather than to the effect of the anæsthetic alone.

I have undertaken the study of one hundred and forty-two cases of patients suffering from different forms of heart disease, and operated upon for different troubles, minor and grave. Some of the operations were attended with a considerable degree of hemorrhage or shock, others with very little of either. I have endeavored to compare the behavior of these cardiac cases with others operated upon for similar affections under as nearly as possible the same conditions, in order to obtain some idea as to the relative effect of the anæsthetic upon the diseased and normal heart. In the Johns Hopkins Hospital for some years past a regular anæsthesia chart has been kept, showing the record of the pulse-rate at five-minute intervals from the beginning of the anæsthetic to the end of the operation. (A specimen chart is shown on page 134.[1])

Of the one hundred and forty-two cases, including organic and functional diseases, there were eight cases of myocarditis. To seven of these ether was given; to one, chloroform and ether. Five took ether badly and three took it well. In the case to which chloroform was administered, it had to be discontinued and ether substituted. The bad effects noted from the anæsthetic were rapid, irregular, and weak pulse, cyanosis, and disturbed respiration. One case, an old woman suffering from general septic peritonitis, due to perforation of the bowels from carcinoma, collapsed on the table and died shortly after, but probably shock and sepsis had more to do with the collapse than the anæsthetic.

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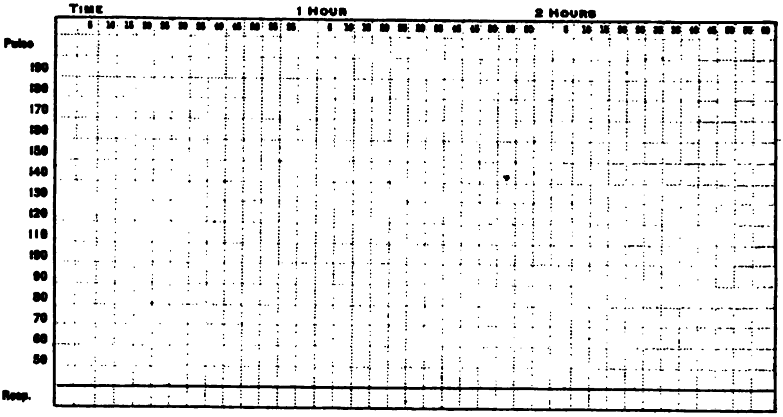
[1] These anæsthetic charts were introduced by Dr. H. W. Cushing, former Resident Surgeon in the Johns Hopkins Hospital.

There were seven cases of aortic insufficiency. Four were operated upon under ether; in three herniotomy was done under cocaine. All bore the anæsthetic well.

There were six cases of mitral stenosis, four of which took ether, two cocaine, and one chloroform. The operations were all major operations, and all bore their anæsthetic well.

There were two cases of aortic stenosis. In each a complete operation for carcinoma of the breast was performed. Both took their ether exceptionally well, and at the end of the operation little change was to be noted in the condition of either.

NAME............ WARD .... OPERATION
DATE.............. ANAESTHETIC
AMT. TO ANAESTHETIZE TIME TO ANAESTHETIZE
TOTAL AMOUNT DURATION OF ADMINISTRATION



REMARKS—

SIGNATURE.

There were forty-nine cases of mitral insufficiency, to thirty-eight of whom ether was administered, to nine cocaine, to two chloroform. Five took the ether badly, and five did not take it altogether satisfactorily, although no anxiety was felt during the course of the administration. The nine cocaine cases, consisting chiefly of herniotomies, all did well. The operations in this group were of all sorts. The majority were cases of herniotomy, appendectomy, fistula in ano, hemorrhoids, etc.

There were seven cases of simple hypertrophy, chiefly athletes. Five took the ether well. The sixth, who was operated upon twice, took the ether badly both times. He was a strong, robust young man, apparently in excellent health, but became cyanotic, with rapid and irregular pulse, and a marked ether rigor as soon as he came into the second stage of narcosis. These operations were chiefly for the repair of accidental injuries, or hemorrhoids, and were not severe.

With functional heart murmurs there were forty-six cases, of whom forty-two took ether, two cocaine, and two chloroform. Of these, seven took the anæsthetic badly. In one the trouble was due apparently to an elongated and hypertrophied uvula, the others from no apparent cause.

There were four cases with a basic systolic murmur, the cause of which was not definitely determined. All took ether; one took it badly. This patient was in a very weak and run-down condition.

There were nine cases of arrhythmia, with no other lesion to be made out. All were given ether; all took it well but one in whom the irregularity of the pulse became more accentuated, but not alarmingly so at any time.

Of twelve cases (the whole number of complete excisions of the breast for carcinoma, in whom heart lesions existed), eight cases of mitral insufficiency, two of aortic stenosis, and one each of mitral stenosis and aortic insufficiency, all took ether well. Of twelve control, normal cases of the same operation, selected at random under as nearly as possible the same conditions, all took ether well. Of six herniotomies under infiltration cocaine anæsthesia, but one exhibited any unfavorable symptoms due to the cocaine. Of six control herniotomies, two exhibited symptoms of cocaine-poisoning.

Of thirty-one cases of herniotomy in patients with various forms of heart disease, fifteen of whom were operated upon under ether, twelve under cocaine, one each under chloroform and eucaine, and two under a combination of chloroform and cocaine, all but two bore the anæsthetic well; one case of mitral insufficiency developed a rapid, thready pulse and some cyanosis, which gradually disappeared after the withdrawal of the anæsthetic. The other was a case of strangulated hernia which collapsed under ether and later developed a pneumonia.

Of nine cases in whom the appendix was resected, where a lesion of the heart existed, all took their ether well save one, whose pulse became weak and irregular, and respiration shallow, with some cyanosis.

It is manifestly impossible from so few cases to draw any very definite conclusions. But it would seem from a study of these one hundred and forty-two cases, that in the myocardial affections only do anæsthetics exert any markedly bad effects. In valvular disease their influence is very slight, but yet appreciable. In functional disturbances insignificant.

In conclusion, I cannot emphasize too strongly my conviction that in every operation the anæsthetist plays almost as important and in some cases a more important rôle than the operator, and one of the reforms most urgently needed in the medical practice of our country to-day is a thoroughly competent corps of anæsthetists in our hospitals, and in our medical schools a thorough and complete course of instruction in the proper methods of administration and use of these agents, so powerful for good when rightly used, so useful in the relief of suffering humanity, and yet capable of producing such disastrous results.

Subjoined is a partial list of the authors and works consulted in the preparation of this paper.

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CARDIAC ACCIDENTS AFTER ANÆSTHETIZATION.[1]

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PERHAPS the least important subject of our discussion to-night is that which for the sake of completeness I have undertaken to consider. Classifying the cardiac diseases as (1) inflammatory affections of the pericardium, myocardium, or endocardium; (2) degenerative diseases of the myocardium; and (3) disturbance of the cardiac innervation, we may simplify the problem by admitting that as far as our present evidence is concerned there is little to warrant the belief that the administration of anæsthetics in the quantities used by surgeons is capable of producing inflammatory disease, excepting, perhaps, of the myocardium.

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[1] Read before the College of Physicians of Philadelphia, May 1, 1901.

Chloroform has been believed by pathologists to be capable of causing fatty degenerations of the intima of bloodvessels and of the myocardium, but it must be confessed that the proof of this view is very questionable, and the thousands of chloroformizations without subsequent disease indicate that such a result is at least a very infrequent one.

It must not be forgotten that the anæsthetics, if they have any power to produce inflammatory or degenerative diseases of the heart, have the best possible opportunity for exercising their deleterious influences, because of their absorption through the lungs and their immediate action upon the heart. If they were capable of producing changes in the tissues generally they would be particularly likely to cause such changes in the heart. It would be easy to demonstrate the effects of anæsthetics upon the heart by administering chloroform or ether to animals in the usual way up to the point of deep narcosis and death, and then examining the heart. Every experimentalist must have had opportunity of studying the heart under these conditions, and degenerations and inflammations have not often been found. It is unlikely, therefore, that the anæsthetics have any direct effect of this sort. It is not impossible that a long continued use in small quantities of such substances might effect inflammatory changes of a chronic sort in the endocardium or myocardium, but with such chronic intoxications we have no present concern. It is more likely, however, that the temporary use of anæsthetics might increase an existing myocardial disease or even initiate such ; and the possibility of disturbing the nervous mechanism of an already diseased heart in such a way as to cause untoward symptoms is manifestly still more likely.

The difficulty in determining the actual cause of cardiac disturbances that follow operations is so apparent that it needs no discussion. The question must always remain an open one whether the anæsthetic or the shock of the operation was the cause of the cardiac disturbances that have arisen after such operation. The only plans for the solution of this difficulty are to draw our inferences from anæsthetizations not followed by operation, and from anæsthetizations with such trivial operations that the shock could not be regarded as a factor of consequence. The former class of cases is so restricted in number that no very accurate data can be obtained. The latter is a more numerous class.

For several years I have been interested in the study of the cardiac conditions before and after gynecological operations, as my attention had been early called to some unexpected results, and through the interest of Drs. Penrose, Beyea, and Hirst the privilege of examining a considerable series of cases was given me. For the purposes of the present discussion this series is a more useful one than would be a similar number of cases of operations in general surgery, as many of the operations were comparatively trivial.

I may classify the results obtained under two heads: First, the results in individuals with valvular or myocardial disease; and, second, the results in persons not known to be suffering with any form of cardiac malady.

The former group included quite a number of cases in which a compensated valvular trouble was recognized before etherization, and in which the heart was carefully observed for some days after the operation. In such I have not infrequently found temporary disturbances of action or of compensation of the heart. This has rarely amounted to more than slight irregularity and palpitation, and might perhaps be accounted for by the changed conditions of diet, etc., to which the patient is subjected after gynecological operations. As a rule, these disturbances of action of the heart have come a few days after the operation, and rarely at the time of the most rigid enforcement of dietary abstinence. I assume, therefore, that it is likely that the operation or the anæsthetization was the cause of the disturbance. I have never seen serious loss of compensation.

In cases of pre-existing myocardial disease which had been recognized, ether has been, as a rule, well borne, and I have seen few cases in which the operation had to be cut short or in which restorative measures became urgently necessary. I have had no experience with chloroform, but, as a rule, these patients have seemed to me to show an improved cardiac condition immediately after the etherization and operation, though some days later there has sometimes been a general flagging of vitality and slow falling off in the strength of the pulse, and in two cases that have come under my personal observation marked cardiac disturbances with sudden death when the operative wound and the original surgical condition had practically healed. One cannot, of course, bring any positive proof that so vague and uncertain a thing as failing strength is dependent upon a weakness of any special organ, but I have the belief myself that in cases of weak heart operations or the anæsthetization incident to them sometimes so increase the weakness of the heart that a falling off in general vitality results.

A recent case that came under my observation illustrates the point I am here making.

A gentleman, aged about sixty-five years, with signs of general atheroma with a slight aortic valve disease, met with a serious accident. I saw him some hours later, and found that he was exceedingly weak, though not exactly shocked. His skin was moist and cool, and his pulse weak and irregular. He was etherized, and his injuries were attended with as little delay as possible, and his condition remained about the same during twenty-four hours. Subsequently, he grew weaker by imperceptible steps, and finally died of sheer exhaustion, without the development of any localized symptoms of any sort. The autopsy showed only fibroid myocarditis and slight aortic valve disease. It seems probable that the nervous shock so disturbed the cardiac action that it flagged increasingly and finally ceased.

Similar cases to this one occur after formal operations. In many of them a terminal pneumonia develops, and this is often ascribed entirely to the etherization or to aspiration of secretions from the throat. While this explanation may be justified in a majority of cases, it does not wholly suffice to account for the conditions met with. A failing circulation renders the base of the lungs more favorable to the development of a hypostatic pneumonia, and the irritation set up by the ether or by aspirated substances acts as the immediate exciting cause.

Another post-operative result to which I wish to call attention is pulmonary embolism. While at first sight this seems in nowise to be connected with cardiac weakness, it is really more or less dependent upon the state of the myocardium. I have seen several examples and discussed the subject in a previous paper. The gynecologists have particularly directed attention to this subject, as the accident in question has occurred after operations for myoma of the uterus more frequently than after any other form of surgical procedure. The embolus which lodges in the lung originates in a thrombus of the pelvic vessels. The sequence of events, therefore, is: thrombus of the pelvic vessels, pulmonary embolism, embolic pneumonia, death. Sometimes this sequence is completed in a surprisingly short time. The rôle played by the heart in this process is that of a predisposing cause, for unless the myocardium is degenerated, as unfortunately it is degenerated in a large proportion of these cases, pelvic thrombosis does not occur after the operation, and embolism is not, therefore, met with.

While the question of degenerations of the cardiac muscle in uterine or other diseases is of no immediate importance in our discussion, I am tempted to refer in this place to some of the published investigations, because they show the importance of proper activity of the heart after operations if certain grave dangers are to be avoided. The fact that such activity is sometimes wanting is due in the first place to the weakened state of the heart, and in the second place to either the operation or the anæsthetization. The cardiac weakness associated with uterine conditions was first described by Schroeder, and later Hofmeyer[1] discussed the same subject; Sänger and Fehling[2] added further observations. The degeneration of the heart found by these observers was most frequently brown atrophy, but occasionally fatty change was recorded. Gessner[3] discusses the subject in detail, and reports seven fatal cases after operation for myoma of the uterus, due to embolism of the lung, and in all of which degeneration of the myocardium existed. Among others he quotes observations of Mahler,[1] who reported six instances with degeneration of the heart, thrombosis, and embolism.

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[1] Zeit. f. Geb. u. Gyn., Bd. xi. p. 363.

[2] Beit. zur operative Behandlung der Uterus Myome. Stuttgart, 1884.

[3] Festschrift für C. Ruge, p. 165. Ueber Tötliche Lungenembolie bei Gynäkologischen Erkrankungen.

Whether the operation or the etherization is the cause of the disturbance of heart action in these cases is, as I said in the beginning, an open question, impossible of solution at the present time. My own feeling regarding the matter is that etherization should be suspected of playing some part in weakening a previously diseased heart; and I would base this upon my experience in two other cases in which no pelvic thrombosis had taken place, in which there was no cerebral or pulmonary embolism, and in which the fatal termination was more or less unexplained, though the heart seemed from the clinical symptoms, as well as from the post-mortem examinations, to be the organ properly under suspicion. The first case was operated upon by Dr. Baldy for a repair of the cervix. I did not see the patient during life, and was not present at the autopsy, but saw the heart soon after the autopsy. The other organs were reported entirely normal, and at first sight the heart appeared equally so, but its substance seemed friable and resembled in its appearance the condition of the myocardium found in protracted fevers. Unfortunately, microscopical examinations were not made. The second case was one in which ventrosuspension was performed by a skilful operator, and the patient remained in good condition for two days, showing no unfavorable symptoms of any sort. On the third day after the operation the pulse suddenly increased in rapidity, the temperature rose, and in twelve hours the patient died. At the autopsy no abnormality was found in any of the organs excepting the heart, which presented a rather congested appearance, and which, on microscopical examination of a number of portions, examined somewhat after the manner of the serial sections of Romberg, showed intense congestion of the interfascicular capillaries and some acute myocarditis. There was no discoverable cause for this condition of things, and it seemed to me at the time, and has seemed to me ever since, that it was probably the result of etherization.

I am well aware that no positive conclusions are to be drawn from a discussion which has necessarily included many statements of opinion rather than of actually ascertained facts. I think, however, that the following statements may be tentatively made.

1. In all cases of cardiac disturbances after operations it is difficult to determine whether the result was due to the anæsthetic or to the operation.

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[1] Thrombose, Lungenembolie und plötzlicher Tod bei Geburtshülfe und Gynäkologie. Arbeiten a. d. Kgl. Frauenklinik in Dresden. Leipzig, 1895, Bd. ii. p. 72.

2. In many cases of recognized cardiac disease the administration of ether has a temporarily beneficial effect upon the cardiac condition. It is not improbable, however, that in some of these the secondary effect is an unfavorable one, the symptoms occurring after a lapse of some days.

3. It is important to recognize that certain results following operations, such as basal pneumonia, gastroduodenal disturbances, and especially embolism, are in reality the results of a weakened state of the heart, and that they may, therefore, owe their development to the anæsthetization or to the shock of the operation.

4. The untoward effects of anæsthetics are, I believe, due to the disturbance of the nervous mechanism or the essential muscular automaticity rather than to organic changes in the myocardium, endocardium, or pericardium.

PRE-EXISTING HEART DISEASE IN REFERENCE TO SURGICAL OPERATIONS.

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The demands of modern life tax the energies of the individual to the utmost. A sound heart in a sound body acquires a new significance, for the stress falls to a large extent upon the circulation. Clinical observers of wide experience believe that diseases of the heart are on the increase, not the mechanical lesions which we so long considered the chief source of cardiac disability, but failure of the heart muscle through disease.

We have, heretofore, measured the heart power by the size of the obstacle to be overcome, but in reality more depends upon the perfection of the cardiac contraction and its ability to overcome resistance. The normal heart has a vast reserve power. The sound muscle fibre quickly recuperates from overwork, and the circulation but momentarily fails. This is not true of the compensating heart. Hypertrophy is a conservative process, but it does not begin at the exact moment the circulation is obstructed, but at a time when at least a portion of the reserve has been expended. Compensation in itself presupposes a lessened reserve force. The more exactly the compensation balances the obstruction the less the liability of cardiac failure under temporary stress. To the surgeon the condition of the cardiac muscle is of prime importance. A crippled heart may compensate for the ordinary affairs of life, but the question is, has it sufficient reserve force to carry on its function during an operation, which, though temporary in character, is attended by an increased call upon the heart's strength? The dangers to be feared are very real, and do not lie entirely in the anæsthetic. The necessary injury to the nerves and other tissues of the body with the loss of blood must be taken into account, and the amount of this operative traumatism cannot always be foretold with certainty.

The circulation demands that the arteries be kept overfull; the heart must be equal to keeping the pressure in the arteries greater than in the veins, and premonitory symptoms of a failing compensation must be earnestly sought before an operation is undertaken in the face of cardiac disease. The reserve power of the normal heart is not as great in infancy and old age, although the writer has not found this to be as true of the latter as the former period of life. Very fleshy people have less reserve force, and from an operative stand-point are generally looked upon with suspicion. People of unusual height are also supposed to have relatively less cardiac reserve. Our experience in the Northwest with people above the average height has been considerable, and we have found them, as a rule, most excellent subjects for operation.

The enervation of the heart plays an important part in estimating an operative risk. It must, at least, be sufficient to enable the reserve force to be called into play. His demonstrated that the power of contraction lies in the muscle fibre of the heart itself, and exists before the cardiac plexus is formed. The vagus and sympathetic are integral factors in the cardiac ganglia, and disturbance of function resulting in excessive rapidity or slowness of the cardiac pulsations may often be traced to reflex conditions acting through the nerve-supply or be a personal or family idiosyncrasy. An irregular or intermittent pulse may also result from the abuse of tea, coffee, or tobacco. The cause in any event should be determined, and the probable influence upon the patient's ability to withstand an operation estimated.

Heart lesions may properly be divided into two general classes: First, valvular and endocardial disease; second, myocardial changes. The sharp distinctions between them have, however, passed away with the advent of better knowledge of the subject. Myocardial changes are often found associated with valvular disease, particularly so when compensation begins to fail, while in the latter stages of myocarditis secondary valvular lesions are common.

Between the ages of ten and forty valvular disease is usually well compensated, and if the heart's action is easy and the circulation well carried out the operative risk is not great, and in our experience we have never lost a patient from this cause. There is but little liability of overlooking the condition, the early development of characteristic murmurs and the ease with which the hypertrophy can be recognized enables the surgeon to gauge the disability with a fair degree of accuracy. The operation is undertaken with full knowledge of the cardiac disability and its character, and the choice of an anæsthetic is greatly influenced by this condition. If there is failing compensation and signs of marked dilatation only operations of the greatest urgency would be undertaken without preparatory treatment. It is fortunate that valvular lesions are the most common during the active period of life, at which time the large majority of operations becomes necessary. After forty, valvular lesions are usually associated with some degree of myocarditis.

I do not wish to be understood as minimizing the importance of primary valvular lesions, but rather to point out that the ease of diagnosis and the fair degree of accuracy with which the compensation can be estimated does not render it a frequent cause of operative mortality. The knowledge of the cardiac insufficiency robs it of much of its danger.

Myocarditis is the condition which the surgeon has reason to fear. There are often no sign-posts of danger, and the first intimation of trouble is the sudden death of the patient upon the operating table or shortly afterward. It may happen that the operation was performed for the relief of some condition which in itself was not serious, and which would not have been undertaken if knowledge of the heart disability had been previously obtained.

That a heart which is not increased in quantity as estimated by the usual means of diagnosis and the quality of its action seemingly unimpaired should suddenly fail when called upon for a temporary reserve force, is an appalling fact, but nevertheless true. Fortunately, the large majority of cases do give signs and symptoms which if looked for with care will enable the surgeon to detect the possibility of disease, and in the later stages the diagnosis may be self-evident. Cardiac symptoms after middle life not plainly pointing to valvular lesions are probably myocardial in origin. Preble quotes the following on myocardial disease from Huchard: "Their evolution is latent, their beginnings insidious, their course paroxysmal, their progress interrupted. They are complicated by a variety of visceral manifestations, and are brutally sudden in their explosions of cardiac insufficiency."

Acute myocarditis results from various infections and may date its origin to an attack of diphtheria, gonorrhœa, quinsy, influenza, or other infectious disease. If death occurs primarily there may be no macroscopical evidence of disease of the heart, the changes are microscopical (Stengel). Acute myocarditis usually passes into the chronic form, but the large majority of cases of chronic myocarditis are so from their inception. The disease is marked by the development of fibrous tissue, and other nutritive changes brought about through lesions of the coronary arteries. Rosenbach believes the fibrosis to be a conservative process and that it braces up a feeble muscular power. Freer, on the contrary, maintains that it is primarily a destructive one, and analogous to fibrosis of the kidney.

Fatty degeneration of the heart, according to Strümpell, Van Leyden and others, seldom gives signs of its presence excepting in the later stages. In experimental fatty degeneration produced by Hasenfeld and Fennyvessy, there was no change in the cardiac size nor was the rhythm or force of the pulse affected. Stokes considered pseudo-apoplexy, soft blowing systolic murmurs with a slow pulse, pathognomonic of fatty degeneration, but as myocarditis was but little understood in his day it was only the cases in which this condition was more marked than the fibroid changes which were recognized. Fatty degeneration is often an accompaniment of myocarditis or one of its results, and the great loss of reserve force which it produces, together with the difficulty of even an approximate diagnosis, makes it the most serious disease of the heart from a surgical stand-point.

Lesions of the aortic opening and valves appearing about middle life can also be classed with myocarditis, and are often associated with it. Changes in the coronary vessels and at the base of the aorta usually coexist. This form of valvular disease has what may be called a physiological basis, and is more serious than similar lesions at the aortic opening in the young. Benike, by a series of measurements, has shown that after forty the aortic opening gradually increased in size, and it is easy to understand how severe work or disease might lead to grave consequences. Myocardial changes, associated with arteriosclerosis and contracted kidney, must also be taken into account.

The writer does not wish to discuss the symptomatology nor pathology of myocarditis, but merely to call attention to the diminished reserve force of the heart which it entails, and point out that many of the unexpected and sudden deaths which take place at or soon after an operation are due to this cause. A patient in middle or later life showing signs of progressive cardiac weakness manifested by a vigorous heart contraction with a feeble pulse, irregular in rhythm and associated with cardiac pain and attacks of dyspnœa with general loss of strength, is to be looked upon with suspicion, and an operation is not to be slightly undertaken. The more advanced cases of myocardial disease present such characteristic symptoms that only life-saving procedures would be indicated. Illustrating the operative mortality, the two following cases are briefly reported.

CASE I. *Cholecystotomy in patient with chronic myocarditis; sudden death forty-eight hours after operation.*—Mrs. J. D., aged thirty-five years, American. First came under observation in September, 1900, with a history of gallstone disease. On examination the heart's action was found to be 120, pulse feeble and intermittent, a faint mitral murmur could be detected. There was slight increase in size. Patient complained of attacks of dyspnœa and oppression in the chest, and at times slight vertigo. No direct history as to the origin of the cardiac lesion. The attacks of colic were frequent and very distressing. Patient pale and anæmic. In the face of grave myocardial disease operation was not advised at this time. On January 5, 1901, she was readmitted to St. Mary's Hospital; the heart's action was very much improved, pulse 112, fairly good quality. Patient's physical condition better, but the attacks of gallstone colic were frequent and some jaundice had followed the last attack. On January 8th cholecystotomy was performed. The operation was easy and quick. There were no complications. Anæsthesia, nitrous oxide, and ether. Time, twenty minutes. Patient was in excellent condition for forty-eight hours, when she suddenly died from cardiac failure without premonitory symptoms.

CASE II. *Abdominal hysterectomy for malignant disease in patient with chronic myocarditis; death on operating table from chloroform anæsthesia.* —Mrs. E. E., aged forty-eight years, German. Admitted to St. Mary's Hospital on January 10, 1901. This patient came under observation four years ago with an ovarian tumor, and at that time had physical evidences of myocarditis. The tumor was removed under ether anæsthesia. She had remained in fair health except for occasional attacks of dyspnœa, palpitation, and a chronic cough. She returns now for the relief of malignant disease of the body of the uterus. On the day following admission the patient developed influenza and bronchial pneumonia, and over two weeks elapsed before she was in a condition for operation. The heart's action was forcible, the pulse full, intermittent, and 120 to the minute. There was marked hypertrophy and a mitral murmur, with evidence of chronic myocarditis. On January 26th abdominal hysterectomy was undertaken under chloroform anæsthesia. This anæsthetic was chosen on account of the bronchitis which had been much aggravated by recent illness. The patient took the anæsthetic badly, and was given but little. The operation had proceeded about ten minutes, when the heart's action and respiration suddenly stopped and the patient could not be resuscitated.

Heart lesions secondary to the disease for which the operation is undertaken may be either valvular or myocardial, usually the latter. The most common are due to obstructed circulation by the pressure of large tumors, especially uterine myofibromata. Hofmeier collected eighteen cases in which sudden death occurred from this cause. Williams, of Bristol, in eight fatal cases unoperated, states that two died from heart disease. Pean met with four severe cases in twenty-four.

There is at first compensatory hypertrophy, later secondary dilatation and degeneration of the heart muscle usually associated with valvular disease. Sibileau, in seventeen cases of this character, notes that the lesions are usually mitral. The dangers to be apprehended are not only at the time of operation, but later from embolus. We have met with five of these cases, all of them associated with large myomata, and in which no history of cardiac disease preceded the development of the tumor. In two the lesions previous to operation were exceptionally severe, and it seemed questionable whether an operation was justifiable. The convalescence of our patients after hysterectomy was uninterrupted, and three of the cases I was able to examine as to the cardiac condition after the lapse of a year or more. The improvement was most marked, the size of the heart greatly diminished, and the valvular lesions could only be detected by the most careful examination.

Without going into the mooted question as to the nature of exophthalmic goitre, it may be stated that at least some cases result in myocarditis or fatty degeneration of the heart, and perhaps this has been one of the causes of sudden death which follow thyroidectomy. In seven thyroidectomies for Graves' disease we had one death from this cause. The history of the case is briefly as follows:

CASE III. *Thyroidectomy for exophthalmic goitre in patient with myocardial disease; operation performed with local anæsthetic; death in twenty-four hours from cardiac asthenia.*—Miss K. S., aged twenty-seven years, American, occupation, house-work. Admitted to St. Mary's Hospital in May, 1899, with a history of exophthalmic goitre which had appeared a year previously. The severity of the symptoms was gradually increasing. The immediate cause of admission was an ovarian cystoma the size of a fourth month pregnancy. During the period of observation the pulse was constantly above 130, no direct evidence of cardiac lesion. The tumor was removed under chloroform anæsthesia. Recovery uninterrupted, and she was discharged in three weeks. Readmitted August 29, 1900. The phenomena attending Graves' disease had markedly increased, pulse weak, and constantly above 140, and on exertion 160 or more. There was a faint murmur to be detected at the apex of the heart, evidently mitral in origin. The heart was somewhat enlarged and forcible in action. Attacks of dyspnœa were frequent, and the patient very anæmic and emaciated. On September 1st the right lobe and isthmus of the thyroid gland were removed under local anæsthesia with cocaine. The operation was not attended by any untoward accidents. The pulse became exceedingly rapid after the operation and a mild delirium supervened. Twenty-four hours later the patient died from cardiac asthenia.

It will be noted that in the three fatal cases reported one died suddenly forty-eight hours after an easy operation apparently well borne. The second died from the anæsthetic on the operating table and the third twenty-four hours after an operation under local anæsthesia. In going over the records of the cases operated upon in the hospital with which I am connected over 1 per cent. have had some form of heart lesion existing before the operation.

THE SAFEST ANÆSTHETIC TO USE IN ORGANIC DISEASES OF THE HEART AND VESSELS.

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IT is a remarkable fact that very few people even with grave cardiac and vascular disease die as a direct effect of the anæsthetic. If statistics were looked into it would be found that very few people die from the effect of the anæsthetic in the presence of cardiac disease. A larger number of people die at stool or on going up stairs when suffering from disease of the heart than from the effects of anæsthesia. It will be found that the anæsthetics when skilfully administered usually exercise what might be called a beneficent rather than an evil influence. I am strongly convinced that in the majority of instances when accidents occur during the administration of an anæsthetic the anæsthetic is not to blame for the fatal result, but rather the shock of the operation. My reason for this belief is that I have had some experience in administering anæsthetics to patients suffering from grave cardiac diseases. I have always approached such cases with the feeling that the danger was very great, and I have again and again seen the patient's condition improve under the anæsthetic, so that in fifteen or twenty minutes after the use of the anæsthetic was begun the condition of the patient has been better than before it was employed.

Another point of great interest is the question of the reserve power of the heart in valvular disease, in which there is compensatory hypertrophy. Usually this is not taken into consideration. In healthy cases there is so much energy used by the heart, and there is so much reserve power. In disease we have very little reserve. As a result, as soon as the shock occurs the diseased heart cannot with the small amount of reserve force meet the conditions which are present.

Another point to be considered before taking up the various forms of anæsthetics is the question of poisoning by these drugs. I venture to say that not one surgeon in a hundred has any conception of the quantity of anæsthetic which his patient receives. Careful histories of the operations may show that so many drachms of chloroform or so many ounces of ether were employed, but this gives no information at all to one who really wishes to know how much anæsthetic the patient has received. Some of the anæsthetic goes into the air, and some into the lungs. The possibility of the patient being poisoned because the dosage is unknown or is not estimated is a very important one. Lawrie, in the consideration of this subject, has deserved much credit. He has taken the point that it is not the dose which is poured on to the inhaler, but the dose which is taken into the lungs which should be watched. He has pointed out that in the presence of irregular breathing (in chloroformization this should be the sign for ceasing the anæsthetic until the respirations become regular) there is great danger of an overdose being taken. As soon as the patient takes deep respirations it is impossible for the anæsthetizer to have any gauge of the quantity of the drug absorbed. When a man fills his lungs with a deep breath of ether a large dose is taken, and the next instant on making a superficial inspiration but a small dose is absorbed.

Another interesting point is in choosing particular anæsthetics. Many men do not look into the individual idiosyncrasies and peculiarities of their patients. Dr. Mayo has stated that persons over the usual height are supposed to be the ones who do not take anæsthetics well, and that this is not his experience. I cannot help being impressed with the fact that most of his patients, while probably over height, nevertheless came of exceedingly strong and powerful stock. For a good many years I was near Minnesota, and found that nearly all these large and powerful people are descendants from the Norsemen and the Swedes. The amount of their vitality is extraordinary. They submit to surgical operations and to serious traumatism with apparent impunity. They sustain dreadful injuries in threshing machines, and go through attacks of typhoid fever and other infectious diseases with extraordinary ease. I think the slight ill effects of the anæsthetics in persons over height in Mayo's experience is unusual, and is not of value in influencing our opinion that persons of great height bear these drugs badly. In this part of the country it is correct; in that part of the country it may be incorrect.

Another point which is overlooked by the clinician and surgeon before operation is the examination of the cardiovascular conditions. In many instances where there is high arterial tension the administration of ether is contraindicated. Ether increases the arterial tension and stimulates greatly the cardiovascular system. So I doubt whether in high tension of the cardiovascular system it is wise to administer ether, though I believe it is as a rule the safest anæsthetic. In regard to the condition of the bloodvessels, I believe American physicians do not employ atropine often enough in the stimulation of the vasomotor system. I have given it frequently in cases and in experiments upon animals. It checks the excessive secretion in the upper air passages and prevents the tendency to œdema of the lungs. Where the respiration is difficult from apparent œdema or diffuse capillary bronchitis it causes a disappearance of the disturbances in breathing which is little less than extraordinary.

The choice of the method by which the anæsthetic is to be administered is more important than the anæsthetic. Several of the surgeons, whom I have considered the greatest, have anæsthetics administered in a way which I think disadvantageous to the patient. They have resorted to a form of apparatus, sometimes connected with an oxygen cylinder, which fits over the nose quite closely. With this is connected a large flat rubber bag. Into this bag the patient expires and inflates it, then inspires and deflates it. He inhales with the anæsthetic a large amount of effete air and carbonic acid gas. It is surely much better to have him exhale into the surrounding air. It has been explained to me by one or two operators that in this way the patient gets more of the anæsthetic and less atmospheric air. I think the patient should be given an amount of oxygen over and above the atmospheric air.

The habit of many of having the oxygen carried to the patient through the anæsthetic has a great many disadvantages. It is probable that the oxygen is capable of producing chemical changes in the drug. When chloroform or ether is used it is impossible to increase the oxygen without increasing the quantity of the anæsthetic, and it is impossible to increase the anæsthetic without increasing the oxygen.

If the oxygen is passed from the oxygen cylinder through a water bottle to the patient's nostril the anæsthetic can be given in accurate dose, and also the oxygen.

In regard to the best anæsthetics, I believe that ether is by far the safest if properly administered, except in vascular disease. It is usually contraindicated in grave vascular disease, in atheromatous conditions, in high arterial tension due to vascular changes. I do not think ether is strongly contraindicated in Bright's disease if it is impressed upon the anæsthetizer that the kidneys are affected and that the ether is to be given with the necessary precautions.

I am much interested to learn from Dr. Finney that Dr. Kelly, who at one time was most enthusiastic in the use of chloroform, has given up its use, because Dr. Kelly told me that he expected to employ chloroform always; that he had found it extremely satisfactory in that it saved time, and he had never had a serious accident.

The use of chloroform in the presence of myocardial change is very dangerous. As Dr. Jacobi has pointed out, it is wrong to suppose that myocardial change is a universal degeneration. Small degenerated patches may be present, and so be overlooked, with fatal results.

Nitrous oxide I believe is very strongly contraindicated in vascular degeneration. I have seen two cases of fatal apoplexy after the administration of the nitrous oxide, principally due to the resulting asphyxia.

In regard to the effect of anæsthetics in the presence of valvular and myocardial disease, particularly in valvular disease, I have seen such patients improve by the administration of an anæsthetic. I have taught that in the presence of circulatory disturbances the chances of the patient are better with an anæsthetic than without it. This view has been proved to be correct by the few cases in which I have seen an attempt to employ the various forms of local anæsthesia in the place of general anæsthesia in the presence of valvular disease. I have seen more than one such case in which the shock was so great that the patient's condition was made infinitely worse, and in which the condition improved as soon as the local anæsthetic was discarded and general anæsthesia was employed. One case seen through the kindness of Dr. Keen especially illustrated this. First, spinal anæsthesia was used, then local anæsthesia, and, finally, ether and oxygen. The changes in the condition of the patient formed one of the most interesting things seen in medicine. The woman, pale, lead-color, with pulse almost absent at the wrist, apparently in a desperate strait, under the influence of ether and oxygen instantly revived. The skin, which a few minutes before was livid and lead-gray, showed the restoration of the capillary circulation, so that she went through the whole operation in a successful manner. It is true that after the operation she had grave circulatory disturbance with some tendency to œdema of the lungs. This, I think, was due more to the shock of the operation than to the administration of ether.

In conclusion, I might say from my own observation of intraspinal injection as an anæsthetic that it will soon be regarded as a medical curiosity. I believe it has not the wide scope of usefulness with which it was heralded, and that in a short time it will be relegated to the same obscurity as Bourgeon's method for the cure of phthisis by the injection of hydrogen sulphide and carbonic acid gas into the rectum.

SOME CONDITIONS OTHER THAN AORTIC ANEURISM WHICH DETERMINE THE OCCURRENCE OF THE TRACHEAL TUG.[1]

By Henry Sewall, Ph.D., M.D.,
OF DENVER, COLORADO.

Since the brief note of Oliver,[2] in 1878, announcing the occurrence of the tracheal tug in aneurism of the aorta and the method for detecting it, the value of the phenomenon as a diagnostic sign has been somewhat in dispute. Macdonnell,[3] using a large clinical experience, committed himself to the statement that "tracheal tugging is never present except in aneurism." Ewart,[4] Toulmin[5] and others have found on systematic examination of persons not the subject of aneurism that a more or less pronounced tracheal tug is present in a large proportion of cases, and Ewart found it more common in males than in females. Auerbach[1] and others have shown that the presence of tumors in certain situations about the aortic arch can cause the tug, and Norris[2] has recently reported a case in which the sign was prominent without postmortem examination revealing physical conditions explaining it.

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[1] Read by title at the meeting of the Association of American Physicians, May, 1901.

[2] Lancet, 1878, vol. ii. p. 406.

[3] Ibid., 1891, vol. i. p. 585.

[4] British Med. Journ., 1892, vol. i. p. 596.

[5] Journ. Amer. Med. Association, 1897, vol. xxix. p. 4.

The excuse for the present paper is, first, that the deductions here presented are based on a much greater number of cases than seem to have hitherto been applied to the subject; second, I venture to believe that a satisfactory explanation of the tracheal phenomenon both in physiological and in most pathological conditions has been demonstrated.

My attention was first definitely directed to the tracheal tug as a diagnostic sign in the case of a gentleman who, for four or five years preceding his death, at the age of sixty, had suffered from a purulent bronchitis, in the abundant expectoration of which tubercle bacilli could only be demonstrated during the last year of life. This patient was racked by paroxysms of a loud, rather ringing cough; the aortic heart sound was much accentuated; the pulmonary signs seemed to indicate pressure by an intrathoracic mass, and during the last year or more of life there developed a very distinct tracheal tug. A tentative diagnosis was made of intrathoracic tumor, malignant (in former years a supposed sarcoma had been removed from the breast), glandular, or aneurismal, complicating tuberculosis. At the autopsy no tumor was found. The lungs were voluminous and contained rather few scattered tubercles, but there was striking thickening and stiffening of the bronchioles and pulmonary bloodvessels, with massive induration of the root of the left lung. Microscopical preparations of the lung, made under the direction of Dr. J. A. Wilder, showed beginning fibrosis of an extraordinary degree. In addition, the left pleura was throughout closely adherent to the chest wall.

On reflection there developed a simple and interesting explanation of the occurrence of the tracheal tug as dependent on the anatomical conditions discovered at the autopsy. When the aorta, looped over the left bronchus, presses upon the air tube sufficiently to transmit to it a pulsation, the downward stroke of the pulsating artery is expended both upon the trachea and on the upper lobe of the left lung. The lung tissue is normally of such extreme extensibility, and its surface glides so readily on the thoracic wall, that any ordinary impulse transmitted by the aorta to the bronchus stretches the lung tissue rather than pulls down the relatively fixed trachea. On the other hand, when the left lung is anchored to the chest wall, as it were, by close pleural adhesions, and when in addition the normal extensibility of the pulmonary tissues is diminished by infiltration or fibrosis, the pulse of the aorta must be registered in movements of the trachea to an increased amount compensating for the lessened mobility of the lung. Moreover, just as the lever of the sphygmograph performs wider excursions as the pressure of its spring on the artery is increased up to a certain point, so we should suspect systolic downward pulsation of the trachea to manifest itself especially under physiological conditions in which the approximation of the aorta to the bronchus where it crosses the latter is closest.

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[1] Abstract in AMERICAN JOURNAL OF THE MEDICAL SCIENCES, March, 1901, p. 340.

[2] American Medicine, March 20, 1901, p. 108.

In order to test the validity of this reasoning, I have during the past year examined 430 persons as to the possession of a tracheal tug. No selection whatever was made as to the kind of cases studied. They included normal individuals as well as subjects of diseases other than known aortic aneurism. In each case the personal history was ascertained, and in nearly all a physical examination of the chest was made. Though it would be desirable to have a far greater number of cases on which to base conclusions, I have to express grateful appreciation for assistance afforded me by many colleagues and friends. Very slight experience made it evident that a downward pulsation of the larynx immediately following systole of the ventricles is an extremely common phenomenon. These laryngeal movements form, as regards their amplitude, a continuous series varying from a just perceptible impulse transmitted to the fingers of the observer at the end of inspiration, to a strong downward twitch of the larynx approaching in vigor the tracheal tug in an appropriate case of aneurism. I have never seen in any of my subjects so marked a tug as that developed in some examples of aortic aneurism. But every aneurism and its signs must have a beginning, and the diagnostic importance of the tracheal tug should depend largely for its specific value on being manifest when the other signs of aneurism have not yet reached their full development. Many observers must have been struck with the gradual disappearance of the tracheal tug in cases of aneurism in which, by one means or another, aneurismal pulsation has been diminished by deposit of fibrin. The suspicion, of course, suggests itself that at least the slighter impulses here described are nothing more than the shocks of carotid pulsation transmitted to the larynx. In answer to this it may be said that the impulse or twitch can only be felt when the fingers are applied to the larynx in such a way as to detect a downward jerk; it is not observed on simply touching the front or sides of the cartilages. To obtain the tug the procedure originally proposed by Oliver cannot be improved upon. The patient should be seated with the head well thrown back. This position elevates the larynx and puts the trachea on the stretch, so that downward impacts are less likely to be lost. The observer, standing behind the patient, places the tips of either his forefingers or middle fingers under the rim of the subject's cricoid cartilage and presses gently upward. Sometimes only the thyroid cartilage can be satisfactorily grasped. Under these conditions the whole larynx is felt to make an inspiratory excursion downward with a return upward in expiration, and a more or less evident tug may be sometimes felt, usually, but not always, confined to the phase of inspiration. The downward, respiratory movement of the larynx becomes very marked with deep inspiration, and when the chest is fixed in this phase of respiration the larynx tends to become rigidly fixed in its lowest position. The downward movement of the larynx is said to be due to the inspiratory contraction of the sternothyroid and sternohyoid muscles. The extraordinary prominence of this movement in conditions of dyspnœa and its frequent lethal significance in disease seems to be out of proportion to the benefits that can be ascribed to the movement. Although the non-aneurismal tracheal tug tends to be confined to the phase of inspiration, the downward movement of the larynx in this condition, and, in fact, any fixation of the larynx by its extrinsic muscles, evidently must interfere with the mechanical conditions permitting the transmission of the movement of the trachea to the larynx. It has frequently occurred in the course of my observations, particularly with subjects of nervous disposition, that a laryngeal twitch which was prominent at the beginning of an experiment completely disappeared when the patient's attention was directed to the respiratory movements. This anomaly was for a time attributed to possible variation in the amplitude of the aortic pulse, as apparently Ewart[1] would explain it, or even to change in the elasticity of the pulmonary parenchyma, such as West[2] has suspected may arise from contraction of its intrinsic muscle fibres. Finally, however, the simpler and more satisfactory explanation was hit upon that the failure of the larynx to transmit the pulsatile movements of the trachea is due to such depression of the former organ through its sternal muscles as to relax the membrane connecting the rim of the cricoid with the trachea.

The general results of my observations are thrown together in a table at the end of this paper, but they may be made clearer by the following statements: In the table the results of the examinations as to the presence or absence of the signs of tracheal tug are classified in the vertical columns according to the prominence of the sign. In the column headed " none " are placed the cases manifesting no pulsatile tracheal movement. In the column " slight " are cases in which only a slight pulsatile twitch was felt. In the column "d" the tracheal twitch was distinct, and the distinctness of the sign was more and more pronounced in the cases in the succeeding columns until in d''' the prominence of the tug might well lead to the suspicion of the existence of a developing aneurism of the transverse portion of the aortic arch. It may be remarked that in my list three cases, in which there could be no fair suspicion of aortic aneurism, exhibited a slight "diastolic shock" which Hall[1] believes to be pathognomonic of aneurisms of the aorta. My subjects varied in age from three years to eighty-five years. The youngest person manifesting a tracheal tug was sixteen years old. The tracheal sign was found relatively most frequently in persons between twenty and fifty years old, the age of greatest frequency being somewhat more advanced in cases having pulmonary disease. Of the 430 cases, 245 were males and 185 were females. The sexes are kept separate in the table, for reasons which will appear later. In order to test the efficiency of the conditions previously discussed to produce a tracheal tug, all cases were divided into three groups. I. Normal individuals, or those in which there was no evidence of left-sided pleural adhesions or pulmonary fibrosis. II. Cases manifesting the signs of tuberculosis at the left apex or giving distinct history of the disorder; also cases which had suffered pleurisy or pneumonia on the left side. III. Cases of marked atheroma or emphysema, including chiefly persons advanced in years. The cases were also grouped according to age.

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[1] Loc. cit.

[2] Allbutt's System of Medicine, vol. v. p. 838.

It is assumed that cases in Class I. had lung tissue of normal elasticity and were without pleural adhesions; that in the members of Class II. there were probably pleural adhesions on the left side, as well as diminished extensibility of pulmonary tissue; in Class III. the extensibility alone of the lung tissue was assumed to be affected.

Of the 245 males examined, 113 are recorded as normal as regards their pulmonary condition. Of these 61 manifested no tracheal twitch, and 52, or 46 per cent., of the 113 exhibited a twitch. No less than 37, or + 32 per cent., of the 113 exhibited a very evident tracheal tug of varying degrees of distinctness. Of 112 males showing evidence of pulmonary lesions probably causing adhesions of the left pleura, only 17 were without signs of the tug, while 95, or 84 per cent., possessed it, and 71, or + 63 per cent., of the 112 showed a very prominent tug.

A striking exception to the occurrence of the tracheal phenomenon in pulmonary disease was found in some tubercular cases in which extensive excavation occupied the site of the left upper lobe of the lungs. This apparent anomaly rather supports the position here assumed as to the conditions determining the transmission of the tug, for when a large mass of pulmonary tissue is absent the bronchus distributed to it cannot be supposed to be fixed on the side of the lung. Also, it is worth observing that in two cases of left-sided pneumothorax (accompanying tuberculosis) there was no tug whatever. Of the male cases of the third class, those showing signs leading to a suspicion of greatly diminished extensibility of the pulmonary tissue, there were twenty examples. Of these 10, or 50 per cent., showed a tug, a proportion differing little from that found in normal cases; but of the 10 cases, in 6, or 30 per cent., the tug was of a decided character.

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[1] AMERICAN JOURNAL OF THE MEDICAL SCIENCES, January, 1900.

A comparative study of the 185 female cases leads to interesting conclusions. In 125 normal persons 99 were found without tracheal twitch, and 30, or + 23 per cent., with it. Of the latter only 10, or less than 10 per cent. of the whole, showed anything like a distinct tracheal tug. On the other hand, of 47 female cases with probable left pleural adhesions, 34, or + 72 per cent., manifested pulsatile tracheal movement, which in 20 cases, or + 42 per cent of the 47, was marked in character. In the third class of females there were but 9 cases showing a tug in 4, or 44 per cent.

The conclusion is manifest that *a tracheal tug quite palpable in character is, in the majority of cases, associated with and dependent upon adhesions of the left pleura. Diminished extensibility of the lung tends to produce the same phenomenon, and the tug is most pronounced when the conditions are combined.*

It still remains to explain why perfectly normal subjects so often exhibit a distinct laryngeal jerk following the heart-beat. This fact seemed to me a mystery until, in the course of observations, a satisfactory explanation developed.

It is noteworthy that the proportion of normal males manifesting the tracheal sign is exactly double that of females of the same class, whereas the difference between males and females having pulmonary lesions is not nearly so marked. Now, the type of masculine respiration is diaphragmatic, while that of feminine breathing is costal. In downward movements of the diaphragm the heart also descends to some extent,[1] and probably draws the aortic arch closer upon the left bronchus and thus improves the chances for the transmission of its pulsation to the trachea. After this explanation it is clear why healthy females should fall so far behind normal males in the frequency of the tracheal pulsation. It is also to be expected that the trachea. phenomenon should, in its milder manifestations, be confined to inspiration. It is easy to prove on anyone exhibiting the tug and having good control over the respiratory muscles that the tracheal jerk accompanies inspiration by the descent of the diaphragm, but that it is absent when air is drawn into the chest only by elevation of the ribs.

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[1] F. H. Williams. Medical Uses of the Röntgen Light. AMERICAN JOURNAL OF THE MEDICAL SCIENCES, June, 1899, p. 678.

A second conclusion may, therefore, be drawn from these observations, namely, *that in the normal individual descent of the heart with inspiratory movement of the diaphragm may so press the aortic arch upon the left bronchus as to impart to the trachea the aortic pulse, recognizable at the larynx as a palpable tug of greater or less distinctness.*

THE NUMBER OF CASES MANIFESTING VARIOUS DEGREES OF TRACHEAL TUG.

	Age in years.	Males, 245.						Females, 185.					
		None	Slight	d	d′	d″	d‴	None	Slight	d	d′	d″	d‴
I. Normal persons and those without signs or history of pulmonary disease.	0 to 10	3	...	...	...	...	...	2					
	11 " 20	5	1	6	1	1	1	15	4	...	...	...	1
	21 " 30	10	6	12	6	3	...	51	8	4			
	31 " 50	29	6	5	...	...	...	22	7	3	1	1	
	51 " 70	13	2	2	...	...	...	7	1				
	Over 70	1	...	...	...	...	...	2					
II Persons with signs or history of tuberculous, pleuritic or pneumonic affection of the left lung.	0 to 10												
	11 " 20	...	...	1	...	...	...	2	1	1			
	21 " 30	7	8	16	9	2	6	6	7	4	1	...	1
	31 " 50	10	13	10	16	4	5	4	5	5	2	1	2
	51 " 70	...	2	...	1	1	...	...	1	1	2		
	Over 70	...	1	...	...	...	...	1					
III. Persons manifesting marked emphysema or arterio-sclerosis.	0 to 10	1											
	11 " 20	...	...										
	21 " 30	...	...	1	1	...	...	1	...	1			
	31 " 50	3	2	...	...	...	...	1		...			
	51 " 70	5	1	1	1	...	...	3	...	1			
	Over 70	1	1	...	...	...	...	...	...	2			

PRIMARY SARCOMA OF THE THYROID GLAND.

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THE history of abnormal conditions of the thyroid gland begins several centuries ago. Although traces of näive knowledge of enlargements of the thyroid body, and indeed of true sarcoma of this organ, also date back many years, a close study of the literature bearing on thyroid tumors has brought to light astonishingly few cases of sarcoma, especially of primary sarcoma. From the earliest publication of Alibert, in 1817, the subject passes unnoticed save the three cases reported by Raynaud, Forster, and Virchow, until 1879, when our knowledge of the subject was very materially advanced by Kaufmann. The basis of this observer's study was seven collected cases, three of which he had observed and examined himself.

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[1] Read before the New York Pathological Society, May 8, 1901.

The later literature has been enriched by other cases reported from time to time mainly by Continental writers. Thus Morf, after a critical search through the literature in 1899, was able to collect, including his own case, only forty examples of this uncommon disease. To this number I have been able to add fifteen others not included in Morf's paper, thus making a total of fifty-five recorded cases. It is only fair to point out, however, that these figures indicate too great an infrequency. Later statistical investigations will undoubtedly show that primary sarcoma of the thyroid gland is much less uncommon.

According to Mueller,[1] secondary sarcoma is also uncommon. Thus of 102 cases of primary sarcoma elsewhere, metastatic invasion of the thyroid and pancreas was noted in only 3.1 per cent. of the cases.

A consideration of the relative frequency of primary carcinoma of the thyroid, especially as compared with that of sarcoma, is not without interest in this connection. Kaufmann, in 1879, had collected twenty-three cases of primary carcinoma, twelve of which had been studied by himself. Rose, in the same year, published a dozen new cases, and Poncet, in 1899, succeeded in collecting fifty other cases, mostly from the comparatively recent literature. The frequency varies, like that of sarcoma, in different sections of country. Thus, Lücke states that he personally observed ten cases in two years in Berne, and states that in goitrous districts malignant disease of the thyroid occurs with greater frequency than elsewhere.

Limacher, of Berne, in 7641 autopsies found carcinoma of the thyroid 38 times, while Chiari, of Prague, found the lesion only 11 times in 7700 post-mortems. Winniwater collected from the post-mortem records of several German universities 548 cases of carcinoma of the thyroid. Of these, 0.73 were primary in the gland. Among 7294 cases of carcinoma collected from British hospitals, in only seven instances was the thyroid the primary seat of the tumor. The relative frequency is about 3 or 4 to 1 of sarcoma.[2]

The case the subject of this paper was clinically observed in the service of Prof. Weir at the Roosevelt Hospital, and later came into my hands for autopsy. The salient points bearing on the clinical and anatomical features alone shall be given.[3] The following are some of the main features excerpted from the history protocol:

J. M., a married woman, aged forty-five years, born in Scotland, was admitted into the hospital January 3, 1901, complaining of a small mass in the neck. The family history is negative as regards tumors, syphilis, or tuberculosis. Ten weeks before present admission into the hospital the patient had been sick with pneumonia; otherwise she had always considered herself a strong and healthy woman. About eight years ago the patient noticed a lump in the middle of her neck at its lower part. It grew very slowly until it reached the size of a small hen's egg. This maximum was attained in about one year. At no time did it interfere either with breathing or swallowing. The patient considered herself quite well until ten days ago, when there appeared within two days a small lump on the right side of the neck just above the middle of the clavicle. Since reaching maximum size on the second day the swelling has remained the same size. On pressure the parts were quite tender. With the appearance of this swelling there developed dyspnœa and dysphagia, which have become more and more severe. There had been no loss of flesh or strength; appetite remained good.

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[1] Cited by Lücke u. Zahn. Chirurg. der Gesch., 1 Theil. Deutsch Chirurgie.

[2] For consideration of primary carcinoma of the thyroid, with bibliography, consult A. E. Halstead, "Carcinoma of the Thyroid Gland," Medicine, Detroit, February, 1901, p. 107.

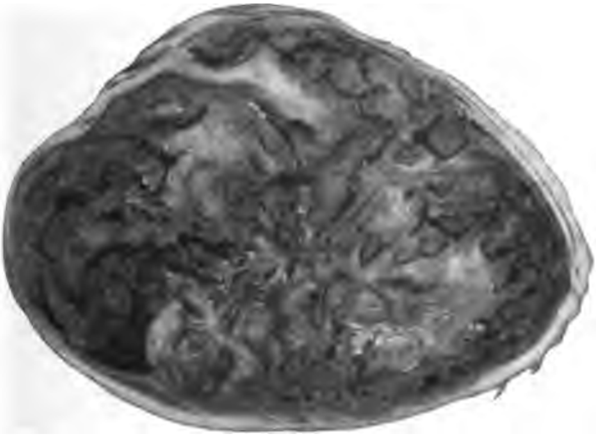
[3] The author is indebted to Dr. George Emerson Brewer, of New York City, for the clinical side of the case.

Physical Examination. Patient is a well-nourished woman, whose breathing is labored and stridulous in character, and there is some loss of voice without hoarseness. In the median line of the neck in the region of the thyroid there is a distinct tumor mass. It extends to the left of the median line one and one-half inches, and tracheal rings can be felt beyond the left border of the growth, which is about the size of an orange. The growth is firm and elastic to the feel. Its outline could be fairly well made out, and it appears smooth and rounded. It is not painful on pressure. The overlying skin is freely movable; with deglutition the mass moves up and down, otherwise it appears more or less fixed to the deeper structures. The smaller mass, to which the patient particularly drew attention, is situated on the right side of the neck one inch above the clavicle near its middle. It is about the size of a walnut, somewhat firm, and very tender. The overlying skin is discolored blue. No enlarged lymph nodes are detected anywhere. The temperature on admission was 99.2°, and the urine contained a trace of albumin, but no casts were observed; the specific gravity was 1018. The operation for removal was performed by Dr. Brewer on the day following admission. Without mentioning the technical details of the surgical procedure, it may be said that the walnut-sized swelling just above the right clavicle was shown to be a hæmatoma located beneath the platysma muscle. The main tumor in the mid-neck was found to be encapsulated and not adherent to the anterior structures. The tumor was smooth, apparently cystic in character, and had replaced the right lobe of the thyroid. The isthmus and left lobe looked normal, and were not removed. Considerable trouble was experienced by the operator from the free hemorrhage which occurred in the incised tissues. No enlarged lymph nodes were observed during the operation. For about one week the patient's condition remained satisfactory, but after that it became increasingly worse from the dyspnœa, which became more and more severe owing to the actively recurrent growth which pressed more and more upon the trachea. Further, the amount of urine passed ranged only from eight to twelve ounces daily. On the sixteenth day after operation moderate ptosis of the right eye was observed. Two days later the right pupil was contracted, the left remaining normal. Toward evening general convulsions developed, and the patient died in full consciousness a little later, apparently from asphyxia.

The temperature, which had been 99.2° on admission, never reached normal, but fluctuated irregularly, with an evening rise of 1° to 2° until death.

Description of Tumor Removed at Operation. This has the size and contour of a goose-egg (7 x 5 x 4 cm.). (Fig. 1.) It is uniformly firm in consistence. The whole mass, which consists of the entire right lobe of the thyroid, is sharply encapsulated by a firm fibrous capsule from 1 to 2 mm. in thickness. Attached to the exterior of the latter are several torn fibrous adhesions. On section the cut surface is for the most part smooth, having a dark-red color in some places, but for the greater portion showing irregular but sharply defined tissue of a yellowish or grayish color, extending from the interior of the encapsulating fibrous tissue in the form of strands, or in less definite forms, as though the tumor-infiltration occurred along the connective tissue framework of the organ. Intermingled with this tissue, which is the tumor proper, is a considerable quantity of fresh and partly clotted blood. At one extremity of the specimen is a cavity about the size of a marble (2 cm.), which also contains clotted blood. (Fig. 2.)

FIG. 1.

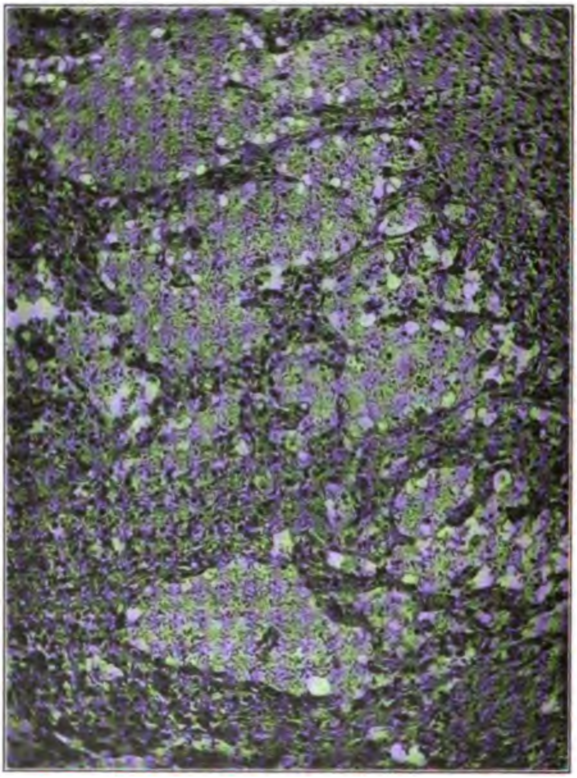


Histological Study of the Tumor. Practically the whole of the normal thyroid tissue has been replaced by tumor growth. The fibrous tissue capsule of the specimen for the most part is made up of dense fibrous tissue, but on one side (left) small portions may be seen in which new growth, similar to that of the main tumor, has occurred. At only one portion was invasion throughout the entire thickness of the capsule noted.

The portions of thyroidal tissue which remained uninvolved by new growth showed changes, partly the result of compression. The alveoli of the gland are irregularly distorted into various shapes from large oval or round spaces into mere slits in the tissue, containing some colloid finely granular material and extravasated red corpuscles. The epithelium, although sometimes normal in appearance, is largely compressed or else has completely disappeared. The fibrous tissue framework of the thyroid adjoining the definitely involved portions shows an abundant round, oval, and spindle-cell infiltration indicating the probable mode of extension of the growth along this portion of the organ.

For the most part the tumor consists of extremely cellular tissue containing numerous larger and smaller blood channels filled with blood. The latter are more or less regularly distributed through the cellular tissue, usually separated from it by a sharply defined layer of endothelium. Occasionally, however, they appear to be mere blood spaces lying between the cells of the tumor without any intervening endothelial wall. Here and there within the bloodvessels may be seen large masses of closely-packed cells, often almost occluding the vessel lumen. They are similar to those making up the main tissue of the specimen.

FIG. 2.



The cellular portion proper of the tumor is made up of closely-packed larger and smaller cells whose nuclei take the nuclear dyes strongly. In morphology they conform to the spindle and small and large round-cell variety, with scanty cytoplasm. The spindle-cells predominate. Beside the former cell types a moderate number of cells of intermediate forms are likewise distributed among the main cell types. Occasional mitotic figures are made out showing evidences of both regular and irregular division of the nucleus. The intercellular connective tissue reticulum is observed only in places and is small in amount. Throughout the tissue between the cells may be seen red blood-corpuscles, extremely abundant in some portions of the tissue.

Histological Diagnosis. Angiosarcoma (mixed cells) of the thyroid. The autopsy was made twenty-three hours after death. The brain was not examined, a partial autopsy only having been permitted.

Anatomical Diagnosis. Primary sarcoma of the thyroid body, with well-marked reduction of the tracheal and œsophageal lumina by the pressure of the new growth; fatty degeneration of the heart; chronic diffuse nephritis; fatty liver; intramural nodular fibromyoma of the body of uterus; fibroadenoma of left breast; œdema and congestion of both lungs.

The incision wound in the neck was filled with granulation tissue and clotted blood. The remaining left lobe of the thyroid and isthmus were converted into a tumor mass irregularly oval in form. The whole mass measured 10 x 6 x 4 cm. It was sharply differentiated from the normal structures of the parts and limited above by the cricoid cartilage and extending downward to just above the clavicle. It reached outward to the right as far as the anterior border of the trapezius muscle; across to the left a little beyond the middle line of the neck, forcing the trachea over to the right side. The trachea was compressed from the front and the left toward the right and backward. The lumen was not completely occluded at any point, but was much narrowed. Thus, at the third ring it measured only 4 mm. in diameter. The œsophagus at a corresponding place was also compressed from the front and the left. The large bloodvessels of the neck were normal in appearance, although displaced well to the left side. On section the cut surface of the new growth presented a dark-red appearance, mottled with small, irregularly sized areas of yellow and gray. There was no distinct evidence of encapsulation. Beyond recurrence at local seat, no metastases were found anywhere in the body, although these were searched for with great care, especially in the neighboring tissues, lungs, and bone-marrow.

The microscopical findings of the viscera confirmed the gross anatomical diagnosis. The histological features of the remaining left lobe and isthmus, which were found involved by new growth, were essentially the same as those already described in connection with the tissue removed at operation.

The bacteriological examination revealed the presence of the colon bacillus throughout the body. No clinical significance was attached to its presence, since it was regarded as the result of post-mortem invasion.

To summarize, then, this case is one of angiosarcoma developing in a goitre and pressing upon the trachea, causing death by asphyxiation. No metastatic growths were found anywhere beyond the local seat of the primary lesion.

The close relationship of goitre to the development of sarcoma of the thyroid gland is of the greatest interest, both from the clinical and pathological view-points. Its common association with goitre and frequent occurrence in goitre countries have been known for many years, and recent observations have brought this forward more conspicuously than ever before. A. Morf very rightly remarks: "If we remember how easily a small enlargement of the thyroid is overlooked in a locality where from one-half to one-third of the inhabitants are afflicted with the disease (Bircher), and also remember that in many of the histories of cases reported no definite statement is made in regard to previous goitre, it is probable that the proportion of cases in which a benign enlargement precedes the malignant growth is larger than appears from the figures."

An analysis of a series of 51 cases of primary sarcoma of the thyroid shows that in 35 previous goitre existed, and in only 16 was it absent. The incidence of thyroid sarcoma at different age periods is not without some interest. Of eight cases which developed between the ages of twenty to forty, one-half only showed previous goitre, while in a series of thirty-two others in which the sarcoma developed between the ages of forty to sixty so many as 27, or 84 per cent., had had goitre before the development of the sarcoma. This, then, indicates clearly enough that with the increase in age of these cases previous goitre becomes more frequent. With regard to its occurrence in the two sexes it may be said that goitre seems to be more frequent in women ; thus, it was present in 59 per cent. of the men and in 79 per cent. of the women.

ANALYSIS OF 51 CASES WITH REFERENCE TO PREVIOUS GOITRE.

Age period.	Number.	Previous goitre.		No previous goitre.	
		Male.	Females.	Male.	Females.
10 to 20 years	1	1	0	0	0
20 " 30 "	3	1	1	1	0
30 " 40 "	5	1	1	3	0
40 " 50 "	14	5	8	1	0
50 " 60 "	18	6	8	2	2
60 " 70 "	10	2	1	4	3
Total	51	16	19	11	5

That sarcoma of the thyroid occurs more frequently in advanced than in early life is a point on which all observers agree. The large majority of them occur after the fortieth year, with comparatively the largest number during the fifth decade.

For the entire fifty-three cases collected in the literature, the greatest number occurred between the years forty to seventy. To this age-period forty-five of the cases belong, while only ten of the fifty-five developed in persons under forty years of age. The earliest age at which primary sarcoma of the thyroid was noted was in a boy, aged eleven years. For reasons which are not very apparent the greatest number of cases occurs between forty and sixty. Morf suggests that this unusual age-prevalence of thyroid sarcoma is perhaps explicable in the light of observations made by Wolfer, who found that the parenchymatous elements of the thyroid become atrophic in later life, this atrophy often being accompanied by copious hyperplasia of the interacinous connective tissue. For my own part this seems insufficient to explain the facts. The influence of sex upon the development of primary sarcoma of the thyroid is probably unimportant. Among the series of fifty-five cases twenty-eight were men and twenty-seven women. The family history evidently plays little part as a predisposing factor. The disease is said to have followed injury to the thyroid in one or two cases. Pick and Forster were disposed to lay greater stress upon this than more recent writers have done. At all events such a factor is rare.

The relation of the origin of the tumor to the anatomical distribution is variable, but in the majority of cases, whether in men or women, the sarcoma originates in the right lobe of the thyroid gland. In forty-six cases in which this lobe distribution is noted, thirty-one, or 86 per cent., originated in the right lobe, and only fifteen, or 32 per cent., in the left lobe. The origin according to sex is as follows:

Sex.	Right lobe.	Left lobe.
Males (25)	19 — 76 per cent.	6 — 24 per cent.
Females (21)	12 — 57 per cent.	9 — 43 per cent.

From this table it may be clearly seen that the relative frequency of right and left lobe origin of the tumor is somewhat different in the two sexes. Thus in man the right lobe was involved in 76 per cent. of the men and in 57 per cent. of the women, showing a comparatively much higher right lobe distribution in men.

Sarcomata of the thyroid ordinarily grow quite rapidly. The duration of the disease varies from several weeks to over one year. Lücke states that the course of the disease is usually less than one year; perhaps eight months represent the average. Death is often induced by involvement of the trachea or œsophagus, or both.

The mortality shortly after operation for removal of the growth has been remarkably high. This is likewise true for extirpation of carcinoma of the thyroid gland.

The physical characters of sarcomatous tumors of the thyroid are quite variable. The size may not exceed that of a small nodule one or two centimetres in diameter. On the other hand, the mass may be of sufficient size to cover the entire anterior surface of the neck. Ordinarily these tumors consist of more or less regular, firm, nodular masses with smooth surfaces. In a large number of instances, especially in the early period of its development, the tumor growth is apt to be confined within the capsule of the thyroid gland. With fuller and more extensive growth invasion of the capsule and neighboring tissues is common.

When the tumor attains a considerable size the anatomical relations of the tissues of this part of the body become considerably changed.

Anatomical structures may be compressed or displaced, or from newly-formed adhesions to the tumor the walls of bloodvessels may become invaded by new growth or destroyed. Thrombosis of the veins has been observed, followed by greater or less circulatory and respiratory changes, and often by œdema of the neck or even the upper half of the body. The skin overlying the tumor may appear normal, or may be invaded by the neoplasm. Implication of the trachea, larynx, and œsophagus has been noted in a very large proportion of the reported cases. Involvement by compression or extension of the neoplasm to one or the other of these structures occurs in 50 per cent. or more of the cases. This is sufficiently explicable for obvious anatomical reasons. The nerves, especially the vagus and sympathetic, are sometimes involved in the process. From complications of this sort disturbances in the vocal cords, ptosis, pupil inequalities, exophthalmos, unilateral facial thermic perturbations, paralysis of the arm, etc., have followed and been observed in different cases.

Metastasis is common in primary sarcoma of the thyroid. Most writers agree that cervical lymph node, lung, and bone involvement with secondary growth are frequent. In a very large proportion of the cases the former are alone invaded. Next in frequency in the order named come the lungs and bone. The same high proportion of lung and bone metastasis is also true for carcinoma of the thyroid. Dissemination of the growth occurs both through circulatory and lymphatic channels. The numerous cell emboli (sarcoma ?) observed in the blood channels and vessels of the case which I have reported in this paper illustrate the former mode of extension quite well, although no secondary growths were observed anywhere beyond the seat of occurrence of the primary tumor. But both Kaufmann and Wolfer have reported cases in which extensive tumor thrombi were found in the large veins.

It has been generally assumed that these rapidly growing sarcomata perforate the connective tissue capsule of the thyroid gland, and thus by extension by contiguity large tumor masses are formed. Braun, on the other hand, believes that these large tumors are formed as often, if not oftener, by coalescence with neighboring tumors which may have originated from secondary foci, such as the cervical lymph nodes, for instance. Within the thyroid tissue itself, as Kaufmann and others pointed out, extension ordinarily occurs along the interacinous connective tissue. From this, pressure and other changes subsequently take place.

The microscopical features of primary sarcomata of the thyroid have been studied by different observers. The greatest diversity in the type of these tumors has been described; but, on the whole, the majority conform in their general morphological characters to either the round or spindle-celled varieties, or a mixture of both. Angiosarcomata and tumors with bony formations have likewise been reported.

Conclusions. 1. Primary sarcoma of the thyroid gland is rare, but probably of more common occurrence than statistics show. It is less frequent than primary carcinoma of the thyroid gland.

2. It is commonly associated with goitre. Those cases developing in persons between forty and sixty years of age show a higher percentage of previous goitre than younger individuals. Goitre associated with sarcoma of the thyroid is more common in women than in men.

3. Sarcoma of the thyroid occurs oftener in late than in early life. The greatest age frequency is between forty and sixty.

4. Sex is probably an unimportant element in its development.

5. The primary tumor most frequently originates in the right lobe of the thyroid body. This distribution seems to be more frequent in men than in women.

6. The clinical course of the disease is usually relatively acute.

7. Involvement by pressure or new growth of the trachea or larynx is common.

8. Metastasis occurs through blood or lymph channels, or both.

9. Round and spindle or mixed-celled sarcomata are most common. Angiosarcomata are not rare.

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SPLENIC-MYELOGENOUS LEUKÆMIA, WITH PULMONARY, LARYNGEAL, AND FAUCIAL TUBERCULOSIS.[1]

By Arnold Sturmdorf, M.D.,
of New York.

Chronic leukæmic conditions, when complicated by intercurrent infections, present reactive cytogenetic phenomena.

The influence of the added infection manifests itself by causing a gradual disappearance of the hæmatological characteristics of the leukæmia.

Observations on this point thus far recorded are limited in scope, embracing principally the influence of *acute* infections, especially those of a septic nature; *chronic* infections associated with true leukæmia barely find mention.

In a recent communication on "Splenic-myelogenous Leukæmia with Pulmonary Tuberculosis," by Elsner and Groat,[2] it is stated that "splenic-myelogenous leukæmia combined with tuberculosis is of such rare occurrence that there is practically no literature on the subject at the present time. The rarity of these complications is made positive by the fact, elicited through private correspondence, that clinicians and pathologists of such wide experience as Stengel, Osler, Cabot, Prudden, and Janeway have never seen a case."

The patient which it is my privilege to present here embodies this unusual association of pathological conditions as manifested by clinical and microscopical findings.

The history of the case is briefly as follows:

Mrs. Annie O. N., aged thirty-five years. Married four years. One pregnancy, the child living and healthy; is now two years old. No miscarriages. The patient complains of aphonia, pain on swallowing, cough, night-sweats, and amenorrhœa of three months' standing.

Family History. The father of the patient died as the result of an accident. The mother, one brother and two sisters, one of whom is reported as having recovered from pulmonary tuberculosis, are living and well. One sister died of tuberculosis at thirty-one. The patient was born in Brooklyn. From her second to her tenth year she lived in the northern part of Ireland, after which she returned to Brooklyn, residing there to the present time. Her environment and habits were always good. She remembers only to have had mild scarlatina, whooping-cough, and measles during childhood. Splenic enlargement was first noticed incidentally during her normal puerperal convalescence two years ago. As it caused no inconvenience it was ignored.

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[1] Presented (with demonstration of patient and blood) to the Section on Internal Medicine of the New York Academy of Medicine, May 21, 1901.

[2] American Journal of the Medical Sciences, March, 1901.

Her present illness began on New Year's day, when, without premonitory symptoms or apparent cause, she awoke suffering from throat pain, cough, and hoarseness. A physician, after several weeks of unsuccessful treatment, sent her to Lakewood, where she remained five weeks without apparent benefit. From that time to the present the local conditions became more aggravated, while her general condition deteriorated, the patient losing twelve pounds in weight.

FIG. 1.

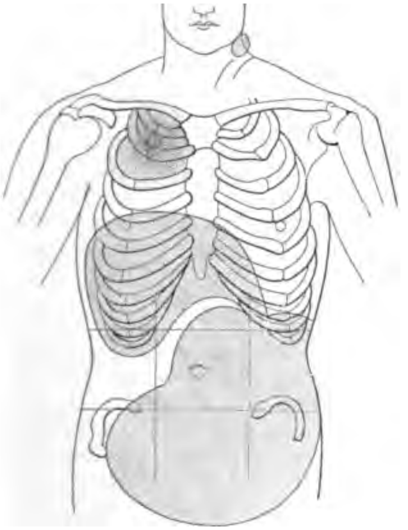
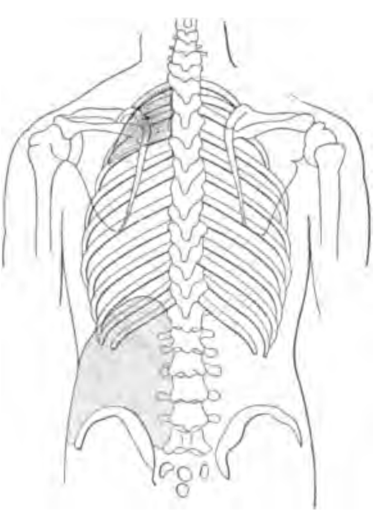


FIG. 2.



Examination on April 17, 1901. A small woman, of slender frame and phthisical habitus. Height, five feet; weight, 112 pounds. No appreciable panniculus. The skin is pale with a grayish-yellow tinge. No icterus. In the flexures of the elbows, groins, and knees are seen red, infiltrated, scaly eczematous patches. The fingers present clubbed extremities. The left submaxillary region contains a packet of enlarged lymphatic glands about the size of a walnut. There are no other lymphatic swellings visible or palpable. Pressure over the sternum and long bones elicits no pain. The abdomen is markedly prominent. There are no visible dilated veins. Temperature 99.5°, pulse 120, respiration 35. Tongue coated. Inspection of the pharynx shows the uvula and left half of the faucial arch, including pillars and tonsils, diffusely red and infiltrated. The junction of the left uvular border and soft palate is deeply fissured. This whole involved area presents a number of discrete, small, round, superficial ulcers, covered by a grayish-yellow coating. The tonsillar crypts are filled with yellow semi-solid plugs.

Laryngoscopical examination reveals a pale, otherwise normal epiglottis. The glottis is obscured by a characteristic pyriform swelling of the left arytenoid and numerous papillomatous excrescences filling the interarytenoid space. The lungs present indistinct cavernous signs between the clavicle and third rib on the right side anteriorly and over the left suprascapular space posteriorly. Examination of the heart proves negative. The liver is large, extending from the fourth rib to a finger's breadth below the free costal margin in the mammillary line. The spleen is enormously enlarged, hard, smooth, and prolapsed; not painful. Its upper pole can be palpated for a short distance beneath the left costal arch. Its anterior border, sharply demarcated, extends over into the right side several fingers' breadth beyond the middle line and presents a distinct indentation at the level of the umbilicus. Its lower pole dips deep into the pelvis, where its characteristic edge can be palpated through the anterior vaginal wall, between bladder and uterus, which latter is crowded backward. Urine hyperacid, deposits a copious sediment of uric acid crystals on standing; otherwise negative. Sputum and smear from the faucial ulcerations show tubercle bacilli in abundance.

Blood examination, April 17th, four hours after last meal, patient resting one hour: Hæmoglobin, 48 per cent. (Gowers); red corpuscles, 2,800,000; white corpuscles, 156,000; ratio about 1:18. Some poikilocytosis, normoblasts, and megaloblasts. No parasites or pigment granules. Differential count shows the following proportions: Myelocytes, 53.20 per cent.; polymorphonuclear neutrophiles, 29.70 per cent.; eosinophiles, 8.80 per cent.; lymphocytes, 7.50 per cent.; basophiles, 0.75 per cent.; transitionals, few.

Therapy: Potassium iodide, saturated solution, gtt. x, t. i. d., to be cautiously increased.

26th. Patient presented herself with a temperature of 103.5°, pulse 118, respiration 26. A careful examination failed to reveal any additional causative element in the production of this temperature. The blood showed the following changes: Hæmoglobin, 50 per cent.; red corpuscles, 3,100,000; white corpuscles, 125,000; poikilocytosis as previous; normoblasts and megaloblasts. Differential count: Myelocytes, 31.25 per cent.; polymorphonuclears, 54.25 per cent.; eosinophiles, 5 per cent.; lymphocytes, 8 per cent.; basophiles, 1 per cent.; transitionals, few.

Thus we find that while the sum total of the white corpuscles remained practically the same, the myelocytes showed a reduction of about 40 per cent., and the polymorphonuclears a disproportionate increase.

Therapy: Fowler's solution alternating with the potassium iodide solution, both in increasing doses.

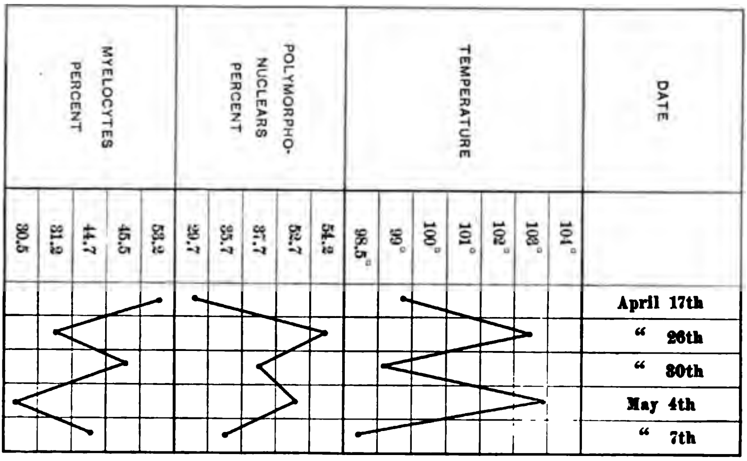
20th. Temperature 99°, pulse 80, respiration 20. Blood examination: Hæmoglobin, 52 per cent.; red corpuscles, 3,200,000; white corpuscles, 120,000. Differential count: Myelocytes, 45.50 per cent.; polymorphonuclears, 37.70 per cent.; eosinophiles, 7.50 per cent.; lymphocytes, 8.50 per cent.; basophiles, 0.50 per cent.; transitionals, few; normoblasts and megaloblasts as above.

In the absence of temperature, we find on this day the myelocytes again resuming preponderant percentage, although not to the degree found in the first examination. The polymorphonuclears, on the other hand, while markedly reduced, had not yet fallen to the level of the first count.

Therapy: Arsenic increased; potassium iodide stopped. The temperature remained normal to May 3d, when it rose again, reaching a maximum of 103.6° within forty-eight hours. After oscillating between 101.5° in the morning and 103.6° in the evening for two days, it began to descend, reaching the normal point on May 10th. From that day to the present there has been no recrudescence of the fever.

Blood-counts made during this interval again showed the characteristic percentage transpositions between the polymorphonuclears and myelocytes noted above, each rise in temperature being regularly accompanied by a corresponding increase in the number of polymorphonuclears and a proportionate decrease in myelocytes, as seen in the following:

May 4th. Temperature, 103.6°; hæmoglobin, 50 per cent.; red corpuscles, 2,950,000; white, 122,000; myelocytes, 30.50 per cent.; polymorphonuclear neutrophiles, 52.65 per cent.; eosinophiles, 6.25 per cent.; lymphocytes, 8 per cent.; basophiles, 2 per cent; transitionals, few; normoblasts and megaloblasts, few.



10*th.* Temperature normal. Blood examination: Hæmoglobin, 52 per cent.; red corpuscles, 3,200,000; white corpuscles, 116,000. Differential count: Myelocytes, 44.75 per cent.; polymorphonuclears, 35.75 per cent.; eosinophiles, 8 per cent.; lymphocytes, 8.50 per cent.; basophiles, 2.50 per cent.; transitionals, normoblasts, and megaloblasts, as above.

At the present writing the patient has been under observation for four weeks. Deductions are obviously precluded. During this period of observation she has been examined personally at least twice weekly. A large number of blood-counts were made, of which those presented above show the most characteristic fluctuations. The counts were invariably made four hours after the ingestion of the last meal. These fluctuations may be summarized as follows:

The occurrence of febrile temperature is accompanied by a characteristic alteration in the relative proportions, but not in the sum total of the white corpuscles. This alteration is manifested principally in the polymorphonuclear and myelocyte elements, the polymorphonuclear count rising parallel with the temperature curve, the myelocytes decreasing proportionately. The chart on preceding page elucidates this more graphically.

This rapid increase in the number of polymorphonuclears suggests an intercurrent leucocytosis. Between the first and last observation made in our case the proportion of white to red corpuscles oscillated from 1:18 to 1:27. Taking normal variations and similar factors into consideration, this difference in the ratio can be discarded. An actual decrease in the myelocytes, however, can be noted, the afebrile count showing a reduction of from 53.2 per cent. to 44.7 per cent., while the febrile count also shows a drop from 31.2 per cent. to 30.5 per cent.

I desire here to express my thanks to Drs. Louis Heitzmann and M. S. Kakels for control counts.

A CASE OF CERVICAL AND BULBAR TABES, WITH NECROPSY.[1]

By Solomon Solis Cohen, M.D.,
of Philadelphia,

and

William G. Spiller, M.D.,
of Philadelphia.

Clinical Report by Dr. Cohen.

The case that forms the subject of the present paper was reported to the Philadelphia Neurological Society in 1889 as a case of "Bulbar Paralysis, with Marked Disturbances of Pain and Temperature Senses and Other Phenomena Pointing to Syringomyelia," and the report was published, together with remarks by Dr. Charles K. Mills, who had seen the patient in consultation, in the *Medical and Surgical Reporter* for July 13, 1889, p. 34 *et seq.* Despite the caution observed by Dr. Mills and myself in the title of our report as just quoted, abstractors and authors have referred to the case as one of undoubted syringomyelia with bulbar symptoms, and as such it has entered into, and to that extent vitiated, the statistics of the affection in question. The results of the necropsy and of Dr. Spiller's careful study of the brain and cord show that the disease causing the somewhat unusual phenomena reported was a rare form of tabes, and not syringomyelia. It is to be hoped that this supplementary record will at least obtain sufficient reading to prevent future incorrect references.

Following Dr. Spiller's suggestion I shall repeat almost in full the previous report, as the symptomatology does not readily lend itself to further condensation and is of great importance. In 1889 the following description was given:

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[1] Presented at the meeting of the American Neurological Association, June, 1901.

The patient is a man, aged fifty-five years, tall, large framed, and of powerful build. He has weighed 230 pounds, and has been capable of feats of great muscular strength. Thirty years ago he contracted the initial lesion of syphilis. He has had secondary but not tertiary symptoms. He cannot give the exact date of the onset of his disease, which probably developed insidiously. In 1872, however, he had attacks of nocturnal incontinence of urine, following relief of a stricture by dilatation and internal urethrotomy, and this symptom has persisted more or less ever since. In 1878 or 1879 his right eye gradually became affected with a peculiar form of ptosis. The lid is closed, but it is possible for him to open it and to keep it open. He finds it more comfortable closed, and hence ordinarily keeps it so. The pupil, he states, was contracted at the time referred to, that of the left eye being dilated. Some years ago, suddenly and without apparent cause, the left pupil contracted and the right pupil dilated. In 1886, being annoyed by a constant biting of his cheeks, he had several teeth extracted. He felt no pain upon their removal. Since that time the present condition has gradually developed. The symptoms now presented may best be described in groups, as they affect motion, sensation, special senses, and organic functions, including nutrition.

Motion. The right side of the face is partially paralyzed. The eye is closed—that is to say, there is apparent ptosis. It is only apparent, however, for the patient can raise the lid at will and does so to do any work. He keeps the eye closed, however, when reading or writing. He can open and close each eye independently of the other. He has very nearly perfect motion of the eyeball, but there is some slight impairment in the internal rectus and in the superior oblique—not noticeable, however, except upon careful testing. The pupil is slightly dilated, but responds at times both to light and accommodation. When I first saw him, a year ago, it was almost completely dilated; a week or two afterward it became contracted; a little later it again dilated to its present condition, its diameter being larger than that of its fellow. The forehead, in elevation of the brows or in frowning, wrinkles nearly as much upon one side as the other, there being an equal number of lines, but somewhat less distinct in the nasal half of the right side. The fan-shaped lines around the eye are nearly as distinct upon the right as upon the opposite side. Below the eye there is a more marked paralysis. The labio-nasal fold is not so prominent as on the other side, but there is no drawing of the mouth when at rest. The lips apparently move equally on both sides in smiling and talking, but the patient cannot whistle, and in the attempt to pucker the lips a somewhat triangular aperture with the apex pointing downward and outward appears at the right side. Prehension and suction are difficult, so that he has gradually been compelled to reduce, and finally almost to abandon smoking. Mastication is quite difficult, and very imperfectly performed. There is considerable difficulty in deglutition, so that solid foods must be washed down with water. Saliva accumulates to a great extent, on account of the difficulty in swallowing it; it can be ejected, but there is some impairment in this action also. There is a sucking-in or drawing-in of the cheeks, probably due to a tendency in the lower jaw to fall slightly, and of the cheeks to fall into the space between the upper and lower teeth. The tongue exhibits fibrillary tremors. It is protruded to the left, though it can be moved in all directions. There is hemiatrophy, the left side being the smaller. The difference between the two sides is not so marked at present as when the case first came under observation—that is to say, the right side has undergone partial atrophy as well. The various motions of the tongue can be performed, though with some difficulty. There is no paralysis of motion of the palate or of the larynx. Speech is somewhat thick, the greatest difficulty in articulation affecting the labial and sibilant sounds. It has improved slightly under treatment. The patient's grip is good, his power of locomotion unimpaired, and he is not conscious of any paralysis of the limbs. However, the right leg at times feels somewhat heavy; and he admits he is not able to lift as heavy weights or to walk as great distances without fatigue as formerly.

Sensation. This varies from day to day, but the following are the principal constant conditions: Tactile sense in general is almost perfectly preserved; at time, there are places upon the face, lips, and within the throat where it seems blunted. The temperature sense is both blunted and perverted upon the right side of the face, more markedly below the eye, where cold is at times called warm. On the trunk and limbs the temperature sense is preserved, but the patient experiences a peculiar feeling of faintness upon the application of cold water, so that he cannot use it for bathing or washing. He has had to abandon sea-bathing for this reason. He could wade into the sea until the water reached the upper third of the thighs, but beyond that it would cause this peculiar feeling of shock with sense of impending dissolution. The pain sense is peculiarly blunted; it is absolutely gone so far as sharp points are concerned in the right side of the face, on the neck, and in irregular areas over the trunk and thighs. These, so far as observed, do not appear to be in relation to particular nerve distribution, but the patient could not submit to the very prolonged and tedious examinations necessary to accurately define the limits of the analgesic areas, which affect both sides of the trunk, more especially above the line of the nipples, both arms and both thighs. To the continued electric current, sensation is perverted. Upon the left side of the face galvano-cutaneous sensibility is almost completely absent; but there are a few points, especially in the canine fossa, where it is so acute as to be absolutely painful. Sudden interruptions of the current are felt as blows referred to the cathode, even upon places where the tingling of the uninterrupted current is not felt. Taste and light sensations can be awakened by interruption of strong currents. Sensation to the faradic current seems preserved at all points, though perhaps quantitatively diminished. Itching of the eyelids, especially of the right side, is frequent. Occasionally neuralgic pains affect the legs, especially the right, and sometimes there are griping pains in the abdomen, not due to indiscretion in food or ordinary causes. There has never been headache. At times there is overpowering drowsiness; the head drops forward, and there is a sensation as of cold water being poured over the neck, followed by intense heat.

Special Senses. Hearing is unimpaired. Smell is somewhat impaired. Taste is absent from the anterior portion of the tongue, but upon pressing the sapid substance—salt or sugar—against the hard palate with the tongue, taste is recognized. The patient says that he detects flavors of food swallowed. Sight is much impaired. No ophthalmoscopic lesion was discovered by Dr. Jackson, who, indeed, found vision exceedingly good. Dr. Jackson gives the following notes of the condition of the eyes:

"Mr. X. was first seen with Dr. Cohen, February 14, 1888, on account of an irritable ulcer of the cornea, which, under the use of eserine and applications of hot water, had quite healed ten days later. At this time it was noted that the pupils were small and reacted very slowly and imperfectly. The patient again came under observation, August 31, 1888, and was seen several times in the succeeding three months. During this period there was no material change in the condition of his eyes, which is as follows: He complained of inability to read or use his eyes in business, and the right eye was constantly kept closed by complete relaxation of the elevator of the upper lid, without any contraction of the orbicularis. Nevertheless, when requested to do so, he opened his eye fully without evidence or sense of excessive effort, and kept it open as long as desired for purposes of examination.

"Both eyes presented compound hyperopic astigmatism, requiring for its correction:

R. + 1.50 sph. + 1.25 cy. axis 120, giving V. = 5/v partly.
L. + 2 sph. + 0.62 cy. axis 90, giving V. = 5/iv most letters.

"His color perception was normal.[1] Fields of vision for form and colors were normal or very slightly contracted concentrically; that is, they were a little smaller than the average normal field, but of normal shape. The ophthalmoscope showed that the optic disks were rather anæmic and 'suspiciously gray,' but they could not be pronounced positively abnormal. Fundus otherwise normal. Media clear.

"The pupils were unequal. Right circular, 6.5 millimetres in diameter; left slightly ovoid with long axis vertical, measuring 4.5 mm. These were the dimensions of the pupils with the visual axes about parallel. There was no power of accommodation, but with strong convergence the pupils very slowly contracted to right 5 mm., left 3.5 mm., and upon relaxing the convergence they very slowly dilated to their original size. They gave no reaction whatever to light.

"The extra-ocular muscles showed power of abduction 10°, adduction 30°, sursumduction sometimes as high as 6°, sometimes as low as 1°. Vertical diplopia produced by a prism with its base up or down showed exophoria (tendency for the visual axes to diverge), varying from nothing to 5° when looking at an object directly in front. A red glass placed before one eye caused crossed diplopia, which increased as the eyes were turned toward the right, and disappeared on looking to the left (special weakness of the right external rectus). With horizontal diplopia, produced by a prism so placed as to cause a horizontal displacement of the image on one retina, the visual axes sometimes remained on the same level; sometimes the right was directed higher than the left, sometimes the left higher than the right (right or left hyperophoria). Without the use of the red glass, or some such intervention, there is no squint and no diplopia, but he gives a history of diplopia in other years."

The patient states that he cannot read or write for long periods, on account of failure of vision, and on account of dimness he has recently been compelled to intermit his occupation in the machine and carpenter shop he had fitted up in his home to employ his time. Within a few weeks he has occasionally experienced sudden attacks of transient blindness, accompanied with vertigo. He has had subjective vertigo, without visual disturbance occasionally, for many years. He has never fallen or lost consciousness in any of these attacks. There is no other visual disturbance.

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[1] But the tones perceived by the right eye were always somewhat different in intensity from those perceived by the left. White at times appeared slightly "yellowish-red" to the right eye; but it could, nevertheless, detect a very faint blue.—S. S. C.

Organic Functions. The heart's action is feeble and irregular. The heart is slightly dilated, but not sufficiently so to account for the disturbance of its rhythm or the enfeeblement of its contractions. At times there are attacks of palpitation. The pulse is soft and will average some eighty odd beats in the minute. There is rarely intermittence. Respiration is free and regular, and normal in its acoustic phenomena. Dyspnœa upon exertion is recent and inconstant. Digestion is not perfect, but offers no special neurotic phenomena. The appetite is failing, and assimilation does not seem to be good. Urination is at times difficult, at times involuntary. Incontinence occurs only at night, at irregular intervals, varying in duration from one to three or four nights. It is a frequent symptom. When there is no incontinence the urine is, as a rule, scanty, varying in quantity from sixteen to forty fluidounces per diem. It is of high color, odor, and specific gravity, containing an excess of urates and phosphates, some calcium oxalate, abundant mucus and epithelium, but no casts, albumin, or sugar. Defecation is irregular, constipation alternating with diarrhœa, the latter often being difficult to control. Recently there have been involuntary, but never unconscious, movements of the bowels at night. Sexual power has gradually become impaired, and has for some months been lost. Nutrition is evidently much impaired. There has been a loss of sixty pounds in weight in six months. The loss has been oscillatory, but, on the whole, progressive. It is more than can be accounted for by difficulty of deglutition, and has occurred despite special attention to the digestion, and the continuous use of highly concentrated and predigested aliment. The muscles are flabby, and, while of good bulk for a less massively designed person, are evidently wasted from former conditions. There are no fibrillary tremors.

Reflexes. The knee-jerk and muscle-jerk are well preserved. The palate reflex is good. The presence of an electrode on the base of the tongue, or in the œsophagus or larynx, induces excessive gagging, even when used merely as a sound; and this becomes intense upon passage of the weakest current, the latter being extremely painful. Tactile sensation in these regions varies, but is apparently somewhat perverted, and the pain and temperature senses are blunted but not lost.

Mentality. The intellectual function is good. There is some disposition to repetition of old stories, and a forgetfulness of details, but the patient being called upon to bring order out of the complicated accounts of a relative's insolvent estate, was able to do so with great ease and clearness of judgment. There are occasional alarming dreams, but probably no more than anyone might have.

Co-ordination is apparently perfect. The patient can execute complicated movements with precision, can stand with his eyes closed, and can balance himself on one foot.

Electrical Reactions. All the muscles respond to a faradic current, though with greatly diminished activity, especially on the right side of the face. Sensation to the faradic current is preserved, but blunted. To the galvanic current response is good in the limbs, but much diminished in the face on both sides, the right more markedly. There are no degenerative reactions. The current produces marked hyperæmia of the part to which the cathode is applied. The patient, during the winter, would frequently complain, on entering the office, that his nose was icy cold, and it would appear blanched, and have a sensation of coldness to the touch. The constant current of a strength of from 2 to 4 milliampères would, in a few minutes, restore the color and warmth. This (cathodal) application was excessively painful.

While the question of diagnosis, and not that of treatment, was the one to be discussed at the meeting to which the foregoing report was made, it was thought well to say that the electric applications appeared to have kept up the nutrition of the facial muscles to a degree greater than could have been maintained otherwise. There had been considerable improvement in the motion of the brow, and in articulation, and the face had not wasted to the same degree as the body generally. General galvanism had also been employed, but not so thoroughly as the facial applications. Digitalis and strophanthin for the heart, in alternation; strychnine constantly for general nutrition; and at different times arsenic, mercuric chloride, auro-sodium chloride, or silver nitrate in the attempt to hold in check the neural degeneration; with temporary expedients to assist digestion, facilitate urination, and repress unpleasant symptoms of various kinds, had been employed after it had been demonstrated that mercury specifically and potassium iodide were alike useless. Malt, alcohol, coca, and the most easily assimilable and concentrated articles of food, including beef peptonoids, peptonized milk, etc., constituted the diet.

The patient lived for nearly twelve years after this report, dying in 1900 from pulmonary œdema consequent upon innutrition, following complete paralysis of deglutition. The history during this period was one of progressive but slow emaciation and loss of strength generally and in both extremities, with decided atrophy of the hands, especially of the left hand. The complaints of "sucking-in of the cheeks" increased, but prehension and suction still remained sufficiently good to permit both pipe and cigar to be enjoyed at various times. There was much irregularity as to this, as also in regard to distinctness or thickness of articulation. Taste was largely lost, and common sensation in the mouth and tongue became so poor that the patient would often lose his food in his mouth and have to find it and push it into the grasp of the pharyngeal muscles with his fingers. For this reason he took only such food as could be swallowed in large morsels, with little chewing or buccal manipulation. The tongue could be moved readily, but was atrophied apparently equally on both sides. There was considerable pain along the ulnar surface of the right hand, and the patient always bent the little and ring fingers out of the way in shaking hands on account of the pain caused by pressure upon them. He also began to complain greatly of pain in the abdomen, and any accidental touch upon it caused great distress. The darting pains down the right leg occurred less frequently, but with greater severity, and morphine or one of its succedanea was necessary at times to give relief. The abdominal pain could not be relieved by internal medication, but the patient was able to manipulate his own abdomen with various analgesic oils, or to place upon it warm cloths and the like. These applications were frequently followed by relief for prolonged periods. It was evident, and it was stated to the patient, who had himself studied medicine although he had never practised, that the pain was not local but due to involvement of the nerve roots. Notwithstanding this he found relief in the local application, whether by physical action, reflex or local, or by psychical action. Mentality continued excellent, however, to the last.

There were during the last years a few transient attacks of vertigo; never a gastric crisis; never ataxia or abasia. He had two attacks of uræmia—one about two years before death, and one about ten days preceding the fatal illness. The former seemed to have been superinduced by relatively excessive doses of heroin, self-administered, to relieve unusually severe attacks of pain. The quantity taken was one eighth of a grain every hour for some four or six hours. Unconsciousness, however, was not caused by cessation of renal secretion, but apparently by the drug, as it occurred after the morning evacuation of the bladder, which, when I saw the patient, was nevertheless over-distended, and from which nearly twenty ounces were removed by catheter. Secretion, however, after this became deficient, almost absent, and death was apparently imminent. Under treatment by persistent hypodermoclysis with physiological saline solution, the hot air bath, and the free use, hypodermically, of nitroglycerin, spartein, strychnine, musk, and camphor, consciousness was regained in about seventy-two hours and was followed by recovery. Convalescence was slow. A catheter urethritis developed, which, however, yielded to appropriate local measures and internal medication.

After this some enfeeblement of memory was noticed, though perhaps not more than the age of the patient might account for. He had to make memoranda of matters to be attended to or inquired about, but that gave him sufficient clue to start the train of thought going. His reasoning powers were still clear; he preserved his interest in books and affairs, and continued to potter around his workshop. He complained, however, that he could not continue at work very long without fatigue, and especially that the pressure of the handle of instruments upon the palm was painful. His writing was good. His chief anxiety arose from progressive failure of vision. Dr. Schneidemann from time to time examined the eyes, and favors me with the following abstract from his books of the more important data:

"Mr. X. was first seen by me January 14, 1896, in Dr. Jackson's absence, he being a patient of Dr. Jackson. From May, 1896, to June, 1898, Dr. Jackson was in the city, and I did not see the patient. On October 17, 1898, he consulted me and once again early in 1899. May, 1899, he was seen by Dr. Jackson. He again consulted me for the last time, October 31, 1900. His chief complaint in all of my interviews with him was irritation of the conjunctiva, such as smarting, scratching, burning, etc. In fact, his principal object in coming was to endeavor to obtain relief from these symptoms. Certain abnormal ocular conditions were present when I first saw him, which persisted with slight changes.

"The right eye presented the appearance of pretty complete ptosis. He was, however, able to raise the lid by voluntary effort, but only did so for some special purpose when asked to, but not ordinarily, as for the purpose of using the eye in conjunction with its fellow for vision. The left eye presented no anomaly of the muscles of the lid.

"The refraction was hypermetropia with astigmatism in both eyes, which varied but slightly at different examinations. October 31, 1900, I prescribed –

O.D. + 3.50 ⊃ + 1. cy. ax. 125
O.S. + 4. ⊃ + 0.62 cy. ax. 90

for near use, the distance correction being:

O.D. + 1.50 ⊃ + 1. cy. ax. 125 = 4/8.
O.S. + 2. ⊃ + 0.62 cy. ax. 90 = 4/5 +.

"The pupils were irregular, their size variable, the right constantly larger than the left. Light reaction was absent at each examination, but contraction was present upon convergence of the visual axes (Argyll-Robertson pupil). At the examination first made by me (1896, etc.) the posterior media were found to be clear. In January, 1899, there was some beginning cortical opacity of the lens of the right eye. This continued to progress so that when I saw him again, October, 1900, the patient himself recognized that the vision in that eye was failing. It did not, however, fall below 4/8, as above mentioned. At this time the lens of the left eye began to show some disturbance.

"The fundi never exhibited any positively significant lesions. The fields of vision for form and color were normal. The nerves did not present any marked departure from the normal, although a suspicion was entertained at times that the color was rather pale; crescents of partial choroidal atrophy were present, but not more marked than is often the case.

"A marked degree of exophoria could be brought out, increasing as the patient looked to the right, and almost diminishing to 0 as he looked to the left; also, very slight right hyperphoria on looking to the right, none on looking to the left. Abduction was 10, and adduction 30 centrads."

The attack of uræmia about ten days before death followed a chill consequent upon exposure in an attempt to assist a carpenter who was repairing the windows in the machine shop. Recovery from the suppression of urine, and the unconsciousness attendant upon it, was more prompt than upon the previous occasion, though the attack was followed by considerable weakness and a greater loss of memory was apparent. Indeed, there was a partial aphasia—that is to say, the patient utterly failed to recall the particular word desired, though perhaps that same word would come readily at another time. He was, however, convalescent and moving around the room, when suddenly one night his utterances became so indistinct that he could not be understood by those about him, and when seen the next morning there was considerable paralysis of the left side of the face and throat. Swallowing was impossible. Articulation was impossible unless the jaw was held shut, when some motion of the lips could be made, and a few words made out. Once or twice during the attack this condition passed off temporarily, so that he could speak one or two words in answer to questions—a fact by which we proved that he had preserved consciousness and was not in coma. He could move his hands and feet, and the paralysis seemed to be chiefly in the muscles closing the jaw and the palate and pharynx. He could even protrude the tongue with some difficulty. As from thirty to sixty ounces of urine were passed daily, and as the heart's action and respiration kept up very well, this last phase of the illness could not be attributed to uræmia or to cardiac failure. This condition lasted nearly four days. The breathing became labored, and the temperature elevated, about twelve hours before death, during which period there was unconsciousness. Death took place apparently from œdema of the lungs. As neither food, water, nor medicine was given by the mouth, there was no possibility of "deglutition pneumonia." The saliva ran out of the mouth at first, but toward the last secretion ceased.

At the autopsy made by Dr. David Riesman, in the presence of Dr. Charles K. Mills, Dr. A. A. Eshner and myself, examination of the thorax and abdomen was not permitted, but we were allowed to remove the brain and spinal cord. The description of the external appearance of the cadaver and the macroscopic aspects of the brain and cord, as dictated by Dr. Mills, follows:

"October 21, 1900. Body of a normal white man, about middle height. Rigor mortis intense. Superficial abrasion on the inner side of the left thigh. Some red spots on the right leg below and over the knee. Face has a peculiar, bluish-gray color (argyria). Nipples also present a bluish-gray color, added to the natural brown. Marked atrophy of the interosseous muscles, and also of the extensor minimi digiti, especially on the left. Hands seemed flexed, thumbs abducted (rigor mortis). Nail-beds bluish-gray in color, especially at base. Body has been injected. Cup-marks from the first to the fourth interspace on both sides. Marked atrophy of the left arm and forearm, particularly the forearm. Left thigh also atrophic, but not markedly so. Marked atrophy of the left calf-muscles. No atrophy of the muscles of the foot.

"Scalp thin. Skull thinner than normal generally. Dura not adherent. No excess of fluid. Fissures deep. Pia arachnoid œdematous and somewhat opaque. Basilar artery exceedingly long and greatly dilated throughout its course. In whole motor region (fronto-Rolandic) from posterior central convolution forward to precentral sulcus, the convolutions are atrophied and the general area presents a depression. The sulci are usually deep and wide, particularly the two limbs of the fissure of Sylvius. The posterior portion of the third frontal is also involved (the whole of operculum and some surrounding tissue), and the foot of the third frontal. On the right side is a recent meningeal hemorrhage at the upper portion of the ascending frontal convolution. There is a marked depression in the situation of the first frontal convolution on the right, forming a shallow trench, oval in shape, the size of a thumb, near the median edge of the hemisphere. The anterior end of the depression is about one inch from the tip of the hemisphere, and the posterior end is near the anterior extremity of the calloso-marginal fissure. There is a depression also on the median aspect, of the same size, immediately posterior to the one on the lateral aspect, extending from the gyrus fornicatus to the edge of the hemisphere. On cutting off the occipital lobes by Dejerine's method, a marked difference appears in the transverse section of the exposed lateral ventricles, the left being nearly twice as large as the right, and oval rather than circular. The choroid plexuses are dark. The left lateral ventricle (on making sections at the level of the callosum) is apparently somewhat larger than the right. The difference in the previous section is due probably rather to dilatation of the posterior horn than to that of the ventricle itself."

After the report of this case to the Neurological Society the diagnostic interest to the attendant gradually faded, becoming replaced by the human interest. Scientific observations and records were not systematically made, attention being given rather to the conservation of strength and the palliation of symptoms. Whether or not therapeutic measures which were continued practically as reported in 1889 are to be given credit for the slow progress of the case it is impossible to say, because the long duration of symptoms before the patient came under observation showed that, for some reason, the tendency to extension was not active. It is possible that closer study during the terminal years might have revealed during life the exact nature of the case, but the diagnosis, ante-mortem, proceeded no further than to postulate a slowly progressive degenerative lesion of irregular distribution, principally affecting the bulbar and upper cervical region, bilateral, though chiefly affecting the right side, and involving the posterior nerve roots at various levels of the cord. Dr. Spiller's careful and able study and analysis will show in how far this was correct, and wherein it failed.

MICROSCOPICAL STUDY AND COMMENTS BY DR. SPILLER.

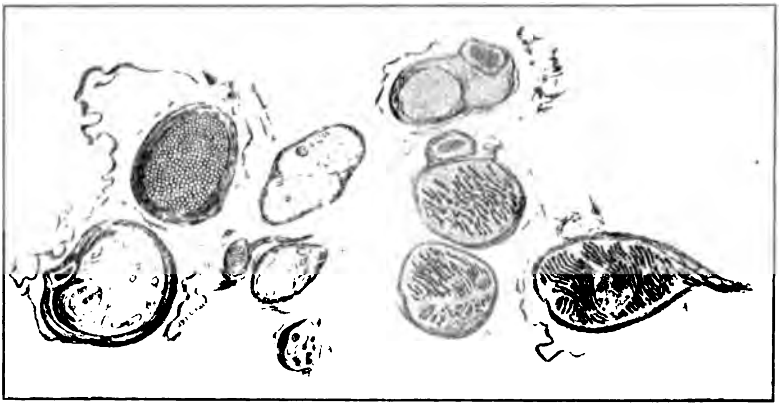
(*From the William Pepper Clinical Laboratory, Phebe A. Hearst Foundation.*)

No distinct degeneration is found in the posterior columns in the mid-lumbar region. The nerve fibres along the posterior septum are not quite so numerous as elsewhere in the posterior columns, but no positive degeneration is found even here. Some of the bundles in the extramedullary portion of the posterior roots show a slight degeneration, but the medullated nerve fibres passing into the posterior horns are numerous. It is doubtful whether the anterior roots could be regarded as at all degenerated. When the lumbar posterior roots are collected and cut separately from the cord so that a large number may be obtained in transverse sections, very little degeneration of these roots is seen. The nerve cell bodies in the anterior horns are numerous and are apparently normal.

In the mid-thoracic region there is no pronounced degeneration of the postero-median columns. The nerve fibres possibly are not quite so numerous along the posterior septum as in a normal cord, but the diminution in the number of the fibres, if it exists, is very slight. When a large number of posterior roots are cut separately from the cord they are found to be much degenerated, and some of the bundles contain no medullary nerve fibres at all, and others very few such fibres. (See Fig. 1.) Even macroscopically the atrophy of the posterior roots of this region was very perceptible when the spinal cord was examined. The bloodvessels within the degenerated posterior roots have much thickened walls and are of a glassy, homogeneous appearance when stained with ammonium carmine. A slight area of sclerosis is seen on the median side of each posterior horn in the area of the root entrance zone.

In the lowest cervical region, at what is doubtless the eighth segment, the posterior columns appear to be normal except in a narrow band within the column of Burdach along each postero-lateral septum and in the right root entrance zone. The left root entrance zone appears to be almost normal. This narrow band of slight degeneration along each postero-lateral septum is the result of partial degeneration of posterior roots in the upper thoracic region. The root entrance zone on the right side in the eighth cervical segment is much degenerated, as is also a portion of the extramedullary posterior root of this segment.

FIG. 1.



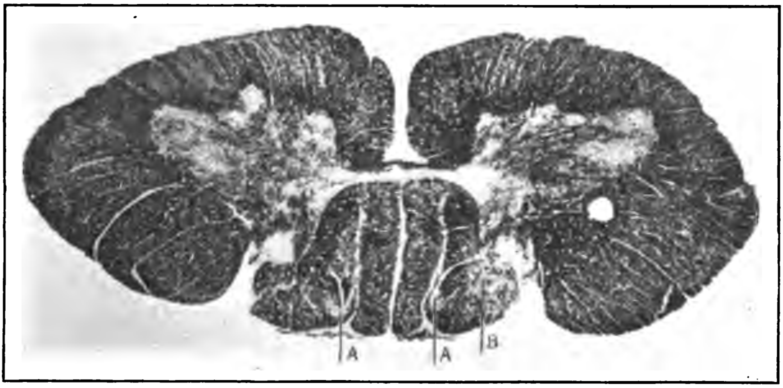
Posterior roots of the mid-thoracic region, cut transversely. The bundles A, A, A, A are much degenerated. The nerve fibres have entirely disappeared in the other bundles.

At the cervico-thoracic junction—*i. e.*, a little lower—the posterior roots in their extramedullary portions are intensely degenerated. At the eighth cervical segment the posterior root on the left side is almost normal. On the right side the posterior roots in the lower cervical segments (see Fig. 2) are partially degenerated, and fewer medullary fibres are found entering the right posterior horn than the left ; at the mid-cervical region no degeneration even of the right posterior roots is seen. A small but distinct area of degeneration in the lower cervical region above the eighth segment is found in each column of Burdach near the periphery of the cord and adjoining the postero-lateral septum, and is in the same position as in the eighth cervical segment. It is the result of degeneration of upper thoracic posterior roots. The degeneration of the posterior roots in the cervical region is almost confined to the right side and the lower cervical levels. No recent degeneration is detected by the Marchi method in sections from the lower cervical region, and the process was evidently not acute. The anterior roots are normal.

No distinct round-cell infiltration of the pia of the cord is present. The nerve cell bodies in the anterior horns are numerous and highly pigmented, which is not extraordinary in consideration of the age of the patient.

Sections from the lower part of the medulla oblongata show no degeneration with Marchi's stain. The nucleus of the left twelfth nerve in its inferior portion is much smaller than the corresponding portion of the right twelfth nucleus (see Fig. 3), and contains fewer nerve cell bodies and fewer medullated nerve fibres. The intramedullary nerve fibres of the left twelfth nerve are not so numerous as those of the right in the inferior portion of the medulla oblongata, but at higher levels a distinct difference between the two nuclei and the intramedullary fibres of the twelfth nerves cannot be observed, and there is no distinct degeneration of these parts. The extramedullary portion of each twelfth nerve is normal.

FIG. 2.



Photograph of a transverse section of the spinal cord from the lower cervical region. A, A. Narrow band of degeneration along each postero-lateral septum, the result of partial degeneration of posterior roots in the upper thoracic region. B. Degenerated root entrance zone on the right side. The corresponding zone on the left side is not degenerated.

The posterior nucleus of the tenth nerve is normal on each side. It is difficult to determine a moderate degeneration of the nucleus ambiguus, but on neither side is this nucleus distinctly degenerated. Some of the nerve cell bodies in this nucleus on each side are much pigmented. The fasciculus solitarius on the left side is greatly degenerated, but on the right side this fasciculus is normal. (See Fig. 3.)

Along the floor of the fourth ventricle are proliferations of neuroglia forming irregular projections into the ventricle.

The lemniscus is normal.

There is some slight perivascular round-cell infiltration in the pia and within the medulla oblongata, but this is not important.

The seventh nucleus and intramedullary fibres of the seventh nerve on each side are normal. The extramedullary portion of the left seventh nerve is probably slightly degenerated, but sections from a corresponding portion of the right seventh nerve appear to be normal.

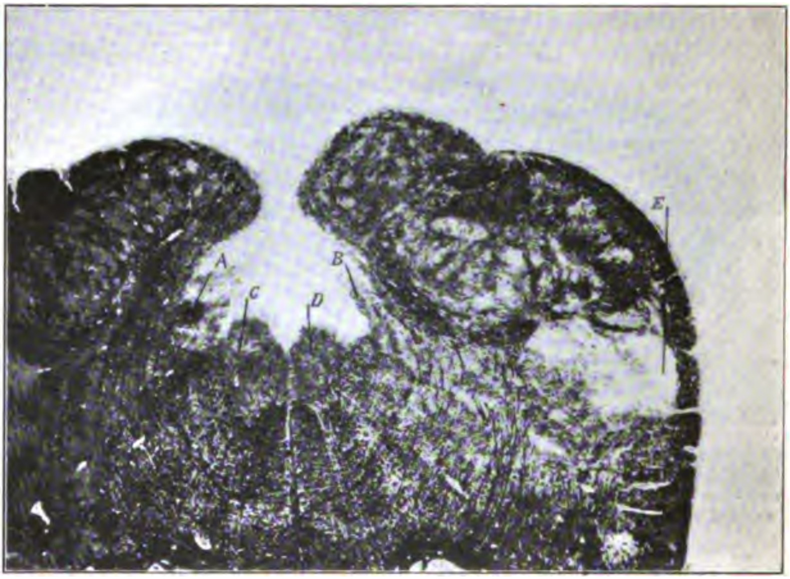
The nucleus and intramedullary fibres of each sixth nerve appear to be normal. The right sixth nerve in its extramedullary portion is partially degenerated, while the left sixth nerve in the corresponding portion is apparently normal.

In the sections examined the fifth motor and sensory nuclei are present only on one side, and these nuclei are normal. A transverse section through the extramedullary portion of the left fifth nerve near the pons shows considerable degeneration of the nerve roots. The spinal root of the fifth nerve on each side is much degenerated, and possibly the ventral portion is a little more degenerated than the dorsal in the inferior part of the medulla oblongata.

The right cerebral peduncle is considerably smaller than the left.

Sections through the oculomotor nuclei contain many nerve cell bodies in each lateral nucleus and in the median nucleus, but the nerve cell bodies in the left lateral nucleus are distinctly fewer than in the right, and cell bodies in all parts of the oculomotor nuclei are atrophied, deeply pigmented, and have peripherally situated nuclei. The contrast is striking in comparison with nerve cell bodies of an oculomotor nucleus believed to be normal.

FIG. 3.



Photograph of a section from the lower part of the medulla oblongata. The nucleus of the left twelfth nerve (D) is much smaller than that of the right twelfth nerve (C) at this level. The descending root of the ninth and tenth nerves on the left side (B) is degenerated, while that on the right side (A) is normal. The spinal root of the fifth nerve (E) is degenerated on each side, but not so completely as the photograph represents, as under the microscope it contains a few nerve fibres.

The giant-cells of the left paracentral lobule are normal, but in some portions of the cortex from this part the capillaries are very numerous.

The right optic nerve appears to be normal, but the left is partly degenerated.

The important findings in this case are: Degeneration of the posterior roots of the spinal cord, hardly perceptible in the lumbar and lower thoracic regions, very distinct in the middle and upper thoracic and on the right side in the lower cervical region but absent in the middle and upper cervical regions. No distinct degeneration of the columns of Goll, and very slight and limited degeneration of the columns of Burdach in the upper thoracic and cervical region; atrophy of the inferior part of the left twelfth nucleus; integrity of the extramedullary roots of the twelfth nerves; intense degeneration of the left descending root of the ninth and tenth nerves, possibly a slight degeneration of the extramedullary portion of the left seventh nerve near its exit from the medulla oblongata; partial degeneration of the extramedullary portion of the right sixth nerve; intense degeneration of the spinal root of each fifth nerve, with partial degeneration of the extramedullary portion of at least one fifth nerve; atrophy and changes in the nuclei of the oculomotor nerves, resembling those occurring when the axones are diseased.

These lesions justify the diagnosis of an atypical form of tabes, and the data of importance in the clinical history are: The acquisition of syphilis some years before the appearance of symptoms of nervous disease; attacks of nocturnal incontinence of urine beginning in 1872; a peculiar form of ptosis of the right eye beginning in 1878 or 1879—*i. e.*, a drooping of the right upper lid, which might have been the result of partial paralysis of the levator palpebræ superioris or of loss of the muscular sense in the lid. The lid could be raised voluntarily, but was more comfortable closed—"springing pupils" dating from 1878 or 1879; it is stated that the contraction and dilatation of the pupil in each eye varied from time to time; some weakness of the facial muscles which may have been the result of loss of muscular sense in the face, as it seems that co-ordinated movements, such as whistling, were most affected; difficulty of mastication and of deglutition; atrophy of the tongue, noticed at first on the left side; disturbance of sensation, especially for temperature and pain, and especially on the right side of the face, which seems to suggest that the right-sided ptosis may have been of centripetal rather than centrifugal origin—*i. e.*, from implication of the muscular sense; occasionally griping pains in the abdomen, not due to indiscretion in food or ordinary causes; and neuralgic pains in the lower limbs, these seeming to be the lancinating pains of tabes; a "suspicious grayness" of the optic disk, inequality of the pupils, loss of reaction of the irides to light, loss of power of accommodation, weakness of the right external rectus muscle, failure of vision—all observed by Dr. Jackson in 1888—loss of sexual power.

In addition to these symptoms atrophy of the upper limbs and pain in the ulnar distribution of the right hand developed, the latter explicable by the degeneration of the posterior roots in the lower cervical and upper thoracic regions on the right side.

It is remarkable that this man had no inco-ordination in the movements of the upper limbs, and that he had not is very evident from a specimen of his handwriting. Dr. Cohen says he had no distinct inco-ordination, and was able to write well and clearly and to do work in his carpenter shop up to within a few weeks of his death. The absence of ataxia is explained by the fact that in the cervical region only the lowest posterior roots were degenerated, more especially those on the right side, and even here these roots contained many normal fibres. The degeneration of the posterior roots in the upper thoracic region explains the severe pains extending into the abdomen.

Dr. Cohen, in his paper published eleven years before the death of the patient in 1900, remarked that he believed an irregularly diffuse and slowly progressive degenerative lesion existed, affecting principally the medulla oblongata. The microscopical examination of the tissues shows that this opinion was correct. The slowness in the development of this atypical form of tabes was most extraordinary, for even after the disease had existed many years, presumably at least since 1878 or 1879, the degeneration of the posterior roots was almost confined to the upper thoracic and right lower cervical regions, and was not complete in these portions. The degeneration of the posterior columns was slight, and was partially masked by the presence of normal fibres from lower levels of the spinal cord. The sections are totally unlike those of the ordinary form of tabes, as the columns of Goll are nearly or fully intact.

It is exceedingly important to note that when this case was reported by Dr. Cohen, in 1889, and at a time when the symptoms of the disease were very pronounced, the knee-jerks were well preserved. The explanation is found in the almost complete integrity of the posterior roots of the lumbar region. The knee-jerks in cervical tabes have usually been found absent.

The mentality in Dr. Cohen's patient does not seem to have been fully normal, because it is stated that there was some disposition to repetition of old stories and a forgetfulness of details. Marie[1] has said that in bulbar tabes mental disturbance is not uncommon, and, indeed, it is not very uncommon in the ordinary lumbar form of tabes.

In 1889 co-ordination was said to be perfect, the patient could execute complicated movements with precision, could stand with the eyes closed, and could balance himself on one foot. As Dr. C. K. Mills pointed out at that time, the symptoms were those of bulbar paralysis, but yet the case was unlike one of bulbar paralysis on account of the marked changes in the pain and temperature senses below the neck as well as above it; the involvement of the bladder, bowels, and sexual organs; the general wasting, and the attacks of pain with vasomotor and trophic changes. It is not astonishing that syringomyelia was thought of. The dissociation of sensation, impairment of pain and temperature senses with greater integrity of tactile sense, was like the disturbance of sensation in syringomyelia, and in 1889 syringomyelia was not so well understood as in 1901. We now know that dissociation of sensation may occur in tabes.

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[1] Traité de Méd., vol. vi. p. 415.

The condition known among the Germans as "springing pupils" ("springende Pupillen"), or "springing mydriasis," deserves attention. Koenig[1] says it is of rare occurrence, and comparatively little has been written on the subject. It has been observed in paretic dementia and tabes, and regarded as a bad omen, but is not necessarily so. It has preceded most of the other signs of paretic dementia five or twelve years (Mendel, Hirschberg). It consists of mydriasis affecting first one eye and then the other, and while it may be found in persons without organic nervous diseases, it should at least make the diagnostician guarded in his statements regarding prognosis. Riegel[2] also believes that it is not necessarily a bad sign. In Dr. Cohen's case the sign was very prominent, and was observed among the first manifestations of disease.

I have not found any reported cases of cervical tabes in which the alteration was in the early stages of the disease, as in this case I have studied, and which so far as the spinal cord was concerned was not only a case of tabes superior, but also one of tabes insipiens. The nerve fibres were not all diseased even in those posterior roots that were most altered, and consequently degeneration of the columns of Burdach is not very intense, because normal fibres in these columns are so intimately mingled with the degenerated fibres that sclerosis has not become prominent, and yet the degeneration was not recent, as no evidence of recent alteration was obtained by Marchi's method. For some mysterious reason the disease of the posterior root fibres progressed very slowly, and seems to have been almost arrested for years, as we may judge from the slow progress of the clinical symptoms and the slow death of the posterior root fibres.

A. Stcherbak[3] is correct when he says we must assume that in the early stages of tabes all the root fibres in the various segments of the cord are not equally affected. The case I have examined permits more than an assumption, and shows that there is a very incomplete degeneration of any one posterior root. It is because of this fact that there are many variations of the clinical phenomena; possibly the fibres conducting the sensory impressions from the skin may be first affected or those from deeper structures, so that in the early stages of tabes there may be disturbance of the cutaneous sensation alone, or loss of the deep sensation without disturbance of cutaneous sensation, or ataxia without disturbance of sensation.

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[1] Deutsch Zeitschrift für Nervenheilkunde, vol. xv., Nos. 1 and 2, p. 122.

[2] Ibid., vol. xvii., Nos. 1 and 2, p. 169.

[3] Neurologisches Centralblatt, 1900, No. 23.

The cases of cervical tabes with necropsy, so far as I have been able to collect them from the literature, are those of Leyden, Dejerine, Martius, Eichhorst, Marinesco, Redlich, and probably those of Mayer and Vucetie. The name of tabes cervicalis seems to have been first employed by the elder Remak for that form of tabes in which the upper limbs are chiefly implicated. It is a very rare type of the disease, and in 106 cases of tabes studied at the Bicêtre, Dejerine[1] observed it only once. It is known also as tabes superior, and on account of its resemblance clinically to syringomyelia Marie[2] warns us to be careful in the differential diagnosis. Very few cases have been reported in the literature, and if we include only those with necropsy the number is exceedingly small. The only cases of tabes cervicalis referred to by Leyden and Goldscheider,[3] in their recent work in the Nothnagel system of monographs, are those of Leyden, Martius, Dejerine, and Redlich. Redlich,[4] in his monograph on tabes, in which we should expect to find the literature fully given, refers to the cases of Leyden, Martius, Eichhorst, Dejerine, Vucetie, Marie, Mayer, and Marinesco. In an earlier paper on tabes, Redlich[5] described a case of cervical tabes, and in his monograph already referred to he describes another. It is desirable to collect these cases of cervical tabes so far as possible, and to compare the symptomatology. In the few that are reported with necropsy the degeneration of the posterior roots does not seem to have been confined to the cervical region, so that in a strict sense tabes cervicalis is a misnomer, but it has been long in use and the predominance of the symptoms is the result of cervical implication, and it is therefore likely that the term will not be abandoned.

In 1876, in his "Klinik der Rückenmarkskrankheiten," Leyden[6] said : "In rare cases the disease begins in the upper limbs; the pains and sensory disturbances are felt here first, and remain most severe here. The lower limbs during the entire course of the disease are not much affected. A case of this kind was described by Gull, and I have recently observed a similar one. The recognition of a case of this character is more difficult because the ataxia is not so prominent. . . . In other cases the symptoms indicate an implication first, or at least chiefly, of the upper portion of the spinal cord; the pains in the head, face, and neck are severe, the ocular symptoms develop early, and the pains of the lower extremities diminish and ataxia does not develop until late." The findings in Leyden's case, to which Leyden[1] refers briefly in the above quotation, he said later were very similar to those in Martius' case. The columns of Burdach were the ones chiefly degenerated, while those of Goll were very slightly affected. Leyden, in 1888, said that his own case and Martius' were the only cases of tabes cervicalis with microscopical examination of the spinal cord on record. It will be seen from this that accurate knowledge concerning the symptomatology and pathology of tabes cervicalis dates from 1876, and yet in the past twenty-five years very few cases with necropsy have been reported. I have not been able to obtain the papers containing the reports of the cases of Mayer and Vucetie.

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[1] Sémiologie du Système Nerveux. Traité de Path. Gén., vol. v. p, 650.

[2] Vorlesungen über die krankheiten des Rückenmarkes, translated from the French, p. 325.

[3] Nothnagel's Specielle Pathologie und Therapie, vol. x. p. 508.

[4] Die Pathologie der tabischen Hinterstrangserkrankung, 1897.

[5] Obersteiner's Arbeiten, 1892, vol. i. p. 26.

[6] Klinik der Ruckenmarkskrankheiten, zweite Band, zweite Abtheilung, p. 350.

In 1888 four cases of cervical tabes, two of which were with necropsy, were published. They were those of Weir Mitchell, Dejerine, Martius, and Bernhardt. Weir Mitchell[2] described a case of cervical tabes without necropsy in which the knee-jerks were excessive on each side.

In Dejerine's[3] case of superior tabes the disease began with impairment of vision and diplopia. Both optic nerves became atrophied and myosis was present. Lancinating pains were felt in the upper limbs and in the back part of the head and in the trunk and thighs. The movements of the upper limbs became so impaired from ataxia that the man had little use of those parts. Walking was difficult, simply because he could not see well, but the movements of the lower limbs were not ataxic. Tactile and pain senses, but not temperature sense, were much retarded in the upper limbs and face, and less so in the trunk. Sensation was almost normal in the lower limbs. The muscular sense was lost in the upper limbs, but preserved in the lower limbs. The olecranon reflex was lost, but the patellar reflex was preserved in the adductors of the thighs, although the jerk of the knee was absent. Romberg's sign was not present. Taste, smell, and hearing were preserved. No visceral disturbances existed. The cerebrum and cerebellum were found to be normal, the posterior roots were much degenerated in almost the entire cervical region and upper part of the thoracic region, and very slightly so in the lumbar region. Slight posterior leptomeningitis existed. The anterior roots were normal. The spinal root of the fifth nerve was much degenerated on each side. Both sixth nerves were degenerated. The posterior columns were much degenerated in the cervical region, less so in the mid-thoracic region, and very slightly so in the lumbar region. Slight alteration of Clarke's column was observed. The anterior part of the spinal cord and the nuclei of the cranial nerves were normal.

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[1] Deutsch med. Wochenschrift, 1888, vol. xiv., No. 9, p. 164.

[2] Medica News, April 21, 1888.

[3] Archives de Physiologie, 1888, 4 Série, Tome i. p. 331.

In the case of cervical tabes reported by Martius the disease began with paræsthesia in the upper limbs, especially in the hands and fingers, and later similar paræsthesia was experienced in the lower limbs, with weakness of those parts. Ataxia could not be detected. The man was unable to distinguish objects by touch when his eyes were closed, and he had some disturbance of pressure and temperature senses. Romberg's sign, Argyll-Robertson's sign, and Westphal's sign were absent; indeed, the knee-jerk was easily obtained on each side and without reinforcement. Still later girdle sensation was felt. The patient died from pneumonia in the same year that his symptoms were studied, but during the pneumonia reflex rigidity of the iris was detected. The knee-jerk was present until death. The degeneration of the posterior columns was most intense in the cervical region, and was very slight in the lumbar region, and Westphal's root entrance zone was fully intact.[1]

Bernhardt's[2] case of cervical tabes was without necropsy. The knee-jerks were absent and the ataxia was very pronounced in the upper limbs but not in the lower.

In Eichhorst's[3] case the posterior columns were degenerated in the cervical and upper two-thirds of the thoracic region. The posterior columns in the lower third of the thoracic region and in the lumbar and sacral portions were not affected, and yet the knee-jerks were lost. Leyden believed that loss of the patellar reflex might occur in tabes from neuritis, but Eichhorst was the first to actually demonstrate in the report of this case that the loss may be so produced. He found intense neuritis of the crural nerves. It is interesting to know that while in this case the posterior roots of the lumbar region were not degenerated, the more peripheral parts of these neurons were greatly altered.

In the case of superior tabes reported by Marinesco the degeneration in the columns of Burdach was distinct at the third cervical segment, and on one side the posterior roots were degenerated as high as this level. The degeneration of the posterior roots extended downward as far as the seventh thoracic segment. The posterior roots were not altered in the lumbar region, but in the cervical the degeneration of the columns of Burdach was intense, much more so than in the case I have studied. The patient had had ocular palsies, impairment of vision, pain in the right shoulder, partial paralysis of the right upper limb with anæsthesia and analgesia of this limb extending to the thorax on the same side, masque tabétique (Charcot), and loss of sensation in the conjunctiva and cornea. There was no disturbance of the muscular sense. The patellar reflex was preserved. The pupils were equal, somewhat contracted, and the irides did not react to light or accommodation. The visual fields were contracted. The oculomotor nerve was paralyzed on each side. The bulb does not appear to have been examined. In the atlas in which this case is published Marinesco[1] gives a picture of a section from the cervical cord from another case of cervical tabes, and in this case the tabetic degeneration was in an early stage.

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[1] Deutsch med. Woch., 1888, No. 14, p. 163.

[2] Zeitschrift für klin. Med., 1888.

[3] Virchow's Archiv, 1891, vol. cxxv. p. 25.

In both the cases reported by Redlich[2] the degeneration of the posterior roots was not confined to the cervical region. In his second case the "local tabetic degeneration"—by which he refers to the degeneration of the posterior roots at their entrance into the spinal cord—began in the upper part of the thoracic cord and extended as high as the upper cervical region.

In the case diagnosticated as one of cervical tabes by de Buck,[3] weakness, ataxia, lancinating pains, and objective disturbances of sensation were present in the upper limbs. The gait was slightly ataxic and Romberg's sign was present. The Achilles reflex was absent on each side, but the patellar reflex was exaggerated on each side. I am not aware that any case of cervical tabes with exaggerated knee-jerks and necropsy has ever been reported, so that we are in complete ignorance of the cause of this exaggeration. De Buck's case was merely a clinical one.

It is not to be supposed that I have included all the clinical cases of cervical tabes. Some are alluded to in a cursory manner. Mott,[4] for instance, refers to one of his cases in which the cervical tabes began in the upper limbs of a mounted policeman, and infers that the greater use of the upper limbs was the cause of this unusual involvement.

Dr. Cohen's case was one of bulbar tabes as well as one of cervical tabes. Bulbar disturbances as a part of the tabetic symptom-complex are not common, although paralysis of the ocular muscles, either transitory or persistent, has been observed not infrequently. Leyden and Goldscheider[5] have found that paralysis of the external ocular muscles occurs in about 40 to 50 per cent. of the cases of tabes, and that paralysis of the external rectus is the most common of these. In Dr. Cohen's case there was distinct paresis of the right external rectus and partial degeneration of the extramedullary portion of the right sixth root near the medulla oblongata. Paralysis of the facial or of the motor portion of the trigeminus is rare, although Peterson and Schultze have each reported a case of paralysis and atrophy of the muscles of mastication in tabes. Leyden,[6] in 1876, said that unilateral facial paralysis sometimes occurs in tabes, but is incomplete and transitory. Hirt[1] regarded facial palsy as such a rare sign of tabes that when it occurs he thought one should consider carefully whether it were not a complication. He observed it in only two out of 345 cases of tabes. Chvostek,[2] in reporting a case of tabes with sensory and motor disturbances in the distribution of the trifacial nerve, difficulty in deglutition, palsies of external ocular muscles, and paralysis of the right facial nerve in the lower part of its distribution, refers in refutation of Hirt's opinion to the cases of Fournier, Kahler, Semon, Dejerine, Peterson, Jeoffroy-Hanot, and Ehrenberg.

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[1] Atlas der Pathologischen Histologie des Nervensystems. Victor Babes. v. Lieferung, 1896.

[2] Die Pathologie der tabischen Hinterstrangserkrankung. 1897. Obersteiner's Arbeiten, 1892. vol. i. p. 26.

[3] Journal de Neurologie, June 20, 1899, No. 13, p. 241.

[4] Lancet, July 14, 1900, p. 87.

[5] Nothnagel's specielle Pathologie und Therapie, vol. x. p. 582.

[6] Klinik der Ruckenmarkskranheiten, zweite Band, p. 344.

In all three of the cases of tabes with bulbar symptoms reported by Cassirer and Schiff disturbances in the lower distribution of the facial nerve were observed, but there were no central changes to explain these symptoms.

In Peterson's case of tabes the weakness and atrophy of the masseter and temporal muscles were pronounced, and in eating the man had to support and assist the lower jaw with his hands. The two pterygoids on each side were paretic. There was no anæsthesia of the face. The left side of the face was a little paretic, the action of the occipitofrontalis was stronger and the nasolabial fold deeper on the right than on the left side.[3]

The facial implication seems, therefore, to have been slight. In Dr. Cohen's case the findings in the seventh nerves and their centres do not afford a satisfactory explanation of the facial paresis, and it is possible that it was the result of disturbed muscular sense from degeneration of the fifth nerves.

Hemiatrophy of the tongue in tabes seems to have been first observed by Charcot and later by G. Ballet. When Koch and P. Marie[4] reported their case they could find only five other cases of hemiatrophy of the tongue occurring in tabes, and only two others with microscopical examination (Raymond and Artaud, Westphal, Koch and Marie). In these three cases the twelfth nucleus on the side corresponding to the atrophied side of the tongue was degenerated. Marie later refers to a case with necropsy reported by Mathias Duval. Cassirer and Schiff refer only to the cases of Raymond and Artaud, Koch and Marie, Westphal, and Eisenlohr, as cases of tabes in which either unilateral or bilateral degeneration of the nucleus of the hypoglossal nerve had occurred, and in all these cases except Eisenlohr's the atrophy of the hypoglossal nucleus was unilateral. In a case of tabes reported by Cassirer and Schiff the hypoglossal nuclei in the greater portion of their extent were normal, but in the distal portion of the nucleus on the side corresponding to the atrophy of the tongue there was a very slight diminution in the number and size of the nerve cell bodies. They regarded this alteration as insufficient to explain the atrophy of the tongue, and they believed the atrophy of the tongue was produced by degeneration of the hypoglossal nerve. In the case I have examined the hypoglossal nucleus in its inferior portion on the side corresponding to the half of the tongue at first most atrophied was much smaller than the corresponding nucleus of the other side, and Cassirer and Schiff 's observation may have more importance than they attribute to it.

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[1] Pathologie und Therapie der Nervenkrankheiten, second edition, p. 529.

[2] Neurologisches Centralblatt, 1893, No. 12, p. 762

[3] Journal of Nervous and Mental Disease, 1890, vol. xvii. p. 450.

[4] Revue de Médecine, 1888, vol. viii. Vorlesungen über die Krankheiten des Rückenmarkes, p. 283.

It is my belief that if the medulla oblongata were studied more frequently in cases of tabes, degeneration of the spinal root of the trigeminal nerve would not be a very rare finding. I have seen it in a number of cases of tabes. According to Cassirer and Schiff, the degeneration of this root was first detected by Westphal in 1864, and later by Oppenheim and Siemerling, Hayem, Flechsig, Vulpian, and others. Cassirer and Schiff found the spinal root of the trigeminus degenerated in three cases of tabes, and in one of these the degeneration was unilateral. They point out that in some cases the root was more degenerated in its inferior than in its superior portion (Oppenheim and Siemerling, Eisenlohr, Zeri), and that in others the dorsal part of the root or the ventral part was most degenerated. In the case I have studied as well as in those of Cassirer and Schiff the glia cells seemed to be more numerous in the degenerated spinal roots. In their cases the sensory nucleus of the trigeminal nerve was perfectly normal, as it was at least on one side in my sections, although in cases reported by others it has been found degenerated. The sensory disturbances in the face that have been observed in cases in which the spinal root of the fifth nerve was found degenerated were not always the same, but Cassirer and Schiff say that in their cases sensory disturbances were always present in the face when the spinal root was greatly degenerated, although a parallelism between the clinical signs and the pathological findings was not present. We shall probably not err if we attribute to the degeneration of the spinal root of each fifth nerve, in Dr. Cohen's patient, the disturbance of sensation in the face, possibly the loss of taste on the anterior portion of the tongue, and even at least some of the motor bulbar symptoms, explaining these as a result of loss of sensory impulses.

In one of his cases of tabes, Oppenheim[1] says paræsthesia and disturbance of function were observed in the distribution of the fifth nerve. The patient's face felt stiff, and he had paræsthesia in the mouth and tongue and difficulty in chewing and swallowing, and yet this difficulty was not caused by disturbance of motor nerves or, at most, very slightly so, as the muscles of mastication were powerful and paresis of the soft palate was very slight. Ataxia of the muscles of the face and tongue and of mastication became so great that when the patient attempted to speak he showed great contortion of the face. All these disturbances were probably the result of alteration of the fifth nerve. In another case in which implication of the fifth nerve existed, chewing and swallowing were difficult, the patient did not know whether any food were in her mouth, and she could extend the tongue properly only when she watched the movements of the tongue in a looking-glass. In both these cases the spinal root of the fifth nerve was degenerated on each side.

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[1] Arch. für Psychiatrie, 1888, vol. xx. p. 131.

Oppenheim[1] says that Duchenne spoke of implication of the fifth nerve in tabes. He also says that the symptoms attributed to degeneration of the spinal root of the fifth nerve have varied considerably in different cases.

The constant biting of the cheeks, for the relief of which in 1886 Dr. Cohen's patient had several teeth extracted, and the absence of pain upon their removal, as well as the loss of food in the mouth, were probably the result of degeneration of the spinal roots of the fifth nerves.

The descending root of the vago-glossopharyngeus is occasionally found degenerated in tabes. Cassirer and Schiff collected twelve cases in which degeneration of this bundle was observed, but only in six of these was the microscopical examination thorough. The absence of disturbance of taste in these six thoroughly studied cases seems to show that integrity of the solitary bundle is not necessary for the function of taste. Disturbances of the functions of the larynx observed in these six cases were not necessarily the result of degeneration of the solitary bundle, because there was also degeneration of the bulbar nuclei or of the peripheral portions of the vagus and glossopharyngeus nerves. In one of the twelve cases the solitary bundle was degenerated, but clinical signs indicative of this degeneration had not been observed. Cassirer and Schiff conclude that the solitary bundle has no relation to the function of taste, or of sensation or motion in the larynx, or to deglutition. The degeneration of this bundle has no relation to gastric crises or disturbances of respiration. Cassirer and Schiff found the large fibres in the solitary bundle degenerated, while the fine fibres were preserved and formed a group on the dorso-median portion of the bundle. In Schlesinger's[2] case both descending glossopharyngeal roots were degenerated, and, according to Schlesinger, the degeneration of these roots has been found in tabes especially when laryngeal disturbances had been present, and yet he merely calls attention to the frequency of the association without expressing himself very positively in regard to the importance of it. It seems from his investigations, also, that degeneration of these roots does not cause disturbance of taste.

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[1] Wiener klin. Wochen., 1894, No. 27, p. 497.

It is possible, however, that the feeble and irregular cardiac action in Dr. Cohen's patient was the result of the degeneration of the descending root of the left vago-glossopharyngeus.

The dorsal nucleus of the vagus has been found degenerated in tabes, and was so in one of Cassirer and Schiff's cases, but these authors were unable to observe positive degeneration of the nucleus ambiguus, and I also have been unable so to do in the sections studied by me.

Cases of bulbar tabes with necropsy are very rare, and v. Reusz,[1] in publishing a case of this kind, says only two other such cases have been reported since the appearance of the paper by Cassirer and Schiff, viz., a case by Grabower and Oppenheim and one by Zeri, but the case by Zeri is probably referred to by Cassirer and Schiff.

SOME OBSERVATIONS ON TYPHOID FEVER COMPLICATED BY CROUPOUS PNEUMONIA, WITH REPORTS OF FOUR FATAL CASES.

By Henry M. Fisher, M.D.,
OF PHILADELPHIA.

Many text-books do not even mention croupous pneumonia as a complication of typhoid fever.

As Niemeyer says,[2] it can easily be overlooked in the same way as the pleurisy with effusion that also occasionally occurs as a complication of typhoid, and it, like the latter, is often unattended either with pain, chill, or increased fever.

That it is not a very unusual complication is shown by the study of Liebermeister's[3] cases in the epidemic of typhoid fever at Basle, 1865–1868, when consolidation of the lungs, not due to hypostatic congestion, was noted fifty-two times among 1420 cases, giving a percentage of the complication of 3.6. That it is a very serious complication is shown by the fact that of these fifty-two cases reported by Liebermeister[4] and Betke,[5] twenty-nine died, showing a mortality, therefore, of 55.7 per cent. Gallisart de Marignac[6] reports thirteen cases with only three recoveries, a mortality for the complication, therefore, of 77 per cent.

Other French observers, as L. Girard,[7] Castex,[8] and G. Destaix,[9] all report a number of cases with a low percentage of mortality. I think, however, that this low mortality must have occurred in an epidemic of an unusually mild type. When we consider the extreme prostration of patients in the second, and particularly the third, week of a severe attack of typhoid fever, an involvement of any large area of their lungs by the pneumonic process can hardly fail to increase very much the gravity of the prognosis.

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[1] Archiv f. Psychiatrie, 1899, vol. xxxii., No. 2, p. 535.

[2] Lehrbuch der speciellen Pathologie und Therapie.

[3] Ziemssen's Cyclopædia.

[4] Loc. cit.

[5] Die Complicationen des Abdominal Typhus. Berlin, 1870.

[6] Pneumonie lobaire. Survenant dans le cours de la Fièvre Typhoïde. Paris, 1877.

[7] De la fièvre typhoïde a début pneumatique. Paris, 1882.

[8] Contribution à l'etude des accidents pulmonaires de la fièvre typhoïde. Paris, 1879.

[9] Considerations sur quelques accidents pulmonaires, et sur la pneumonie pseudolombaire en particulier, survenant dans le cours de la fièvre typhoïde.

The etiology of the complication is an interesting one.

It seems probable that in many cases the pneumonia is due to a mixed infection. In fact, both typhoid bacilli and pneumococci have been recovered from the lungs of patients who have died of pneumotyphus. In other cases it seems reasonable to believe that the pneumonia is purely septic. Such are the cases where a pneumonia develops with great rapidity and with fulminating symptoms, perhaps late in the course of the typhoid fever, and is rapidly fatal. One such case occurred during my late service at the Episcopal Hospital, the fourth on my list. This developed in a boy who, after several weeks of fever of rather an indefinite type, suffered from an acute otitis media. Two or three days later his lungs, which had been clear before, rapidly filled up, and he died within twenty-four hours after the first signs of pulmonary congestion. Unfortunately, in this case cultures were not made from the lungs. The intestines showed apparently recently healed typhoid ulcers.

Dr. D. Betke's[1] observation would seem to show that the complication has been more frequent since the cold bath treatment has been in vogue than before, but that the mortality from the complication since the treatment has been instituted has been considerably less. While it may be difficult or impossible to make the diagnosis of typhoid fever when pneumonia occurs, as it sometimes does in the various stages of typhoid fever and masks the symptoms of the latter, a high degree of leucocytosis occurring in the second or third week of typhoid fever ought to make us suspect the occurrence of this complication.

As Destaix[2] observes, the normal leucocytosis of the first week of typhoid fever diminishes rapidly in uncomplicated cases after the seventh day of the disease. Often, too, but by no means invariably, the onset of the croupous pneumonia is announced by a marked rise in the temperature and an increase in the respiration rate. The sharp pain in the side and the rusty sputa are seldom observed.

In the following case the diagnosis was unfortunately not made, the pulmonary symptoms having been, perhaps, unusually pronounced. The marked abdominal pain and tenderness were supposed to have been caused by a rapidly developing tubercular peritonitis.

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[1] Loc. cit.

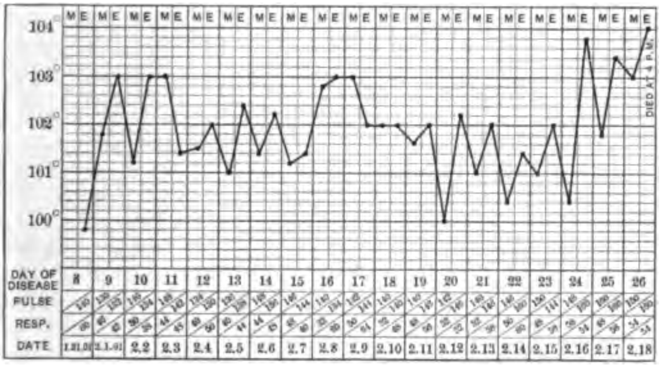
[2] Considerations sur quelques accidents pulmonaires survenant dans le cours de la fièvre typhoïde. Paris, 1877.

It will be observed in this case that while there was a distinct leucocytosis noted on the third day after her admission, on only one occasion, three days before death, was a weak positive Widal reaction noted.

Case I.—Jennie R., aged sixteen years, was admitted to the Episcopal Hospital under my care on January 31, 1901. Notes by Drs. Steel and Francis Sinkler.

Two years ago the patient was in the hospital with nervous prostration. One week before admission she was seized with a sudden pain in the right side, accompanied by a chill and fever. Cough began three days ago, unaccompanied by expectoration. Upon admission she complained of muscular pains, shortness of breath, and cough. Her bowels were opened three times on the day of her admission. Complete anorexia and insomnia. Temperature on admission was 99.4°. Breathing labored and rapid; face flushed, extremities cold. Friction sounds heard all over right chest except at apex, and mucous râles over base posteriorly, and tubular breathing heard over a limited area of the left lower lobe posteriorly, and mucous râles over upper lobe. Abdomen negative. Urine shows a faint trace of albumin, but no casts.

Chart 1.



February 1*st*. Condition fair. Leucocytes 17,800.

2*d*. Rigidity and extreme tenderness of the whole abdomen, with slight tympanites. Pulse weaker.

4*th*. Tubular breathing and crepitant râles over whole left lung.

5*th*. Widal reaction negative.

6*th*. Urine shows a faint trace of albumin, one granular cast, granular epithelium, and chains of bacteria.

9*th*. Widal reaction still negative; less cough. Abdomen tympanitic and very sensitive to the touch. No spots. Pulse rapid and slightly irregular Breathing rapid and entirely costal. Two loose stools.

11*th*. Leucocytes, 9000. Oxygen administered last night; improved pulse and respiration temporarily, though latter still much labored.

13*th*. Widal reaction still negative. Leucocytes, 6200.

16*th*. Weak positive Widal. Slight leucocytosis.

18*th*. Widal negative; no leucocytosis; patient weaker; respiration shallow.

19*th*. Patient died at 6.30 A.M.

Autopsy revealed bed-sore over sacrum. Abdomen full of foul-smelling pus, partly free and partly in abscess lying between and around the organs. Pelvis contained about one pint of pus. Mesenteric glands enlarged.

Intestines. Ileum shows ulcerated Peyer's patches. There is one perforation at the hepatic flexure of the colon and another about three inches above the sigmoid flexure. Both perforations are at the seat of ulcerated Peyer's patches.

Liver enlarged and shows fatty degeneration.

Spleen large and soft. Pulp semi-liquid.

Kidneys. Right: atrophic, of the size of the last joint of the thumb. Left: about twice the normal size; no pathological change.

Thorax. Visceral pleura adherent to parietal over entire surface except at base of chest. Half a pint of sanguino-purulent fluid in upper surface of diaphragm. Hepatization of lower lobes of both lungs.

Heart. Pericardium not inflamed; no increase of normal fluid; mitral valve showed vegetations on each leaflet.

In the following case congestion of the lungs was noted eight days after admission or probably toward the end of the second week of the fever. Distinct evidences of pneumonia were not, however, found until the twenty-first day after her admission to the hospital. In this case the attack of pneumonia was ushered in by a distinct chill, and the patient had also rusty sputa and dyspnœa.

CASE II. *Typhoid fever, complicated by croupous pneumonia* (from hospital record of Dr. Steel).—Amelia P., aged nineteen years, single, born in England, mill hand, was admitted to the Episcopal Hospital, January 3, 1900. Has suffered from chlorosis, with a good deal of gastric and intestinal indigestion. Three weeks before her admission to the hospital she was obliged to stop work on account of weakness, vertigo, and headache. No epistaxis or diarrhœa, but insomnia.

On admission her temperature was 103.2°. She was pale, but appeared fairly well nourished. Her conjunctivæ slightly jaundiced; her cheeks flushed; her tongue coated, but red at the tip and edges; slight prolongation of the expiratory murmur at the right apex; a soft systolic apex murmur. Her abdomen was slightly tympanitic, and there was tenderness in both iliac fossæ. No rose spots. Splenic dulness extends upward to the seventh space. Liver dulness normal.

Blood Examination. Widal, negative; hyperleucocytosis, 10,000; red blood-corpuscles, 4,608,000; hæmoglobin, 60 per cent.; index, 65.2 per cent.

Urine. Specific gravity, 1014; acid; no albumin; no glucose; no casts; epithelium and leucocytes.

January 7th. Blood shows a positive Widal reaction to-day.

9th. Stools light, partly formed. Crops of rose spots developed to-day. Spleen palpable on deep inspiration.

11th. Hard cough for past twenty-four hours. Lungs show considerable congestion posteriorly. General condition good.

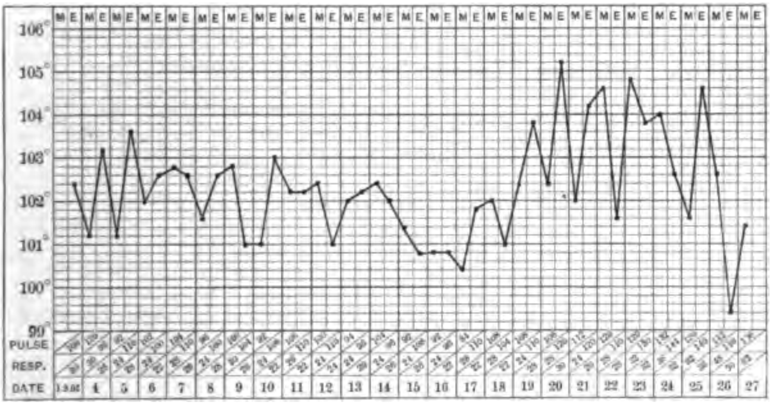
14th. Diminished resonance with sibilant râles all over left lung. Complains of constant headache. Red blood-corpuscles, 4,728,000; hæmoglobin, 65 per cent.; index, 70 per cent.

22d. Cough not so severe and looks decidedly better. Lungs still full of sibilant râles. As the cold sponges fail to reduce temperature, this afternoon at 7, patient's temperature being 104°, she received a plunge bath, and her temperature fell to 101.6°. There was a little shivering after the bath. On the 23d she had three plunge baths, her temperature having risen to 104.8°. At 4 P.M. she had a distinct chill.

24th. Patient's temperature rose to 105° to-day, and she was slightly delirious. Baths stopped. Bases of lungs more congested, and there is a distinct area of tubular breathing just below and to the inner side of the lower angle of the left scapula; sputum rusty. She had another chill last night.

25th. Temperature rose at 4 A.M. to 105.5°. This morning tubular breathing is heard over a more extended area of the left lung. Dyspnœa has increased, and at 4 P.M. her respirations were 40 in the minute. Examination of the blood shows a marked leucocytosis. Urine shows a distinct trace of albumin, but no casts.

CHART 2.



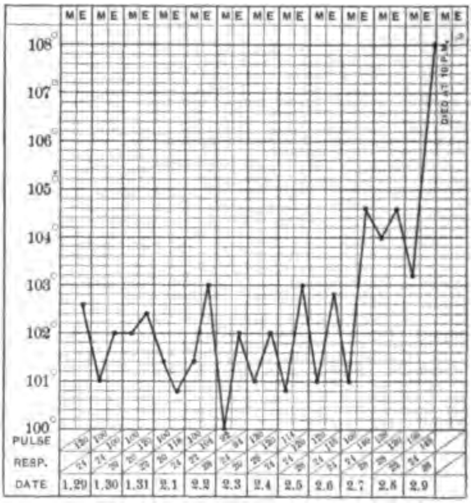
26th. At 7 this morning patient's pulse was 148, and her respiration 40. This afternoon at 4 o'clock her pulse had dropped to 116 and her temperature to 101.5°. There were signs of consolidation of the whole upper lobe of the left lung and of the upper two-thirds of the lower lobe. Bowels loose, and again of the "pea-soup" character. At about 5 o'clock in the afternoon there had been rather a sudden marked change for the worse. Her pulse was very weak—160 to 180—and she was in a state bordering on collapse. My resident, Dr. Steel, exposed the median basilic vein and injected about one pint of hot normal salt solution, but during the operation dyspnœa increased and her color became livid. Immediately afterward strychnine, grain one-twentieth; nitroglycerin, grain one-fiftieth, and whiskey, twenty minims, were injected hypodermically, and this injection was repeated in about an hour. The injections and salt solution appeared to give slight temporary relief, but in spite of very free stimulation no marked improvement occurred. She died at 6 o'clock in the morning.

27th. In reference to the clinical notes I see that the patient had been receiving strychnine sulphate, grain one-sixtieth to one-fortieth, and ammonium carbonate, grains ten, every alternate four hours since January 21st; also whiskey in half-ounce doses every three hours, and on the 23d or 24th she was also given tincture of musk in twenty minim doses every three hours. No autopsy was permitted.

In the next case the occurrence of rather a high degree of leucocytosis—45,300—on the tenth day after the patient's admission, or probably toward the end of the third week, coincidently with the physical signs of pneumonia and marked rise in temperature, was interesting. It is to be regretted that an autopsy could not be secured.

Case III.—Edward M., aged sixteen years, was admitted to the Episcopal Hospital under Dr. D. J. Milton Miller's care, January 29, 1901. Notes by Dr. Ziegler. Patient had been ill for seventeen days and confined to bed for a week. No epistaxis and no cough, but some diarrhœa. Constant headache and occasional delirium. Face flushed and has a listless expression. Lungs clear, heart negative. Spleen somewhat involved. Abdomen moderately distended and tympanitic, and numerous rose spots on its surface. A good deal of hebetude, and at times somewhat delirious. Both buttocks are reddened and excoriated, and over the right great trochanter there is a small area of superficial ulceration. Urine shows a decided trace of albumin, but no casts. Diazo-reaction present. Widal positive. Leucocytosis absent.

Chart 3.



January 31*st*. Has had small doses of morphine for the last two nights to give him rest. This has been effectual, though he moans a good deal in his sleep. Is very delirious. Bowels very loose, and stools thin and yellowish and passed involuntarily.

February 2*d*. Noisy at night; involuntary passage of urine and feces. Bed-sore on his back.

5th. Low muttering delirium. Did not react well to plunge. Trional and chloral were given to secure sleep. He slept after this, but moaned and talked in his sleep. Peripheral circulation weak.

6th. Condition improved. Plunges were given at temperature of 90°.

7th. Suggestion of tubular breathing; no other change observed, except some dyspnœa.

8th. Still noisy at night and sleep disturbed. Restless also during the day; very nervous. Reflexes increased; ankle-clonus present. Complains of pain in his head. Leucocytes, 45,300.

9th. Pulmonary second sound accentuated. Right heart dilated, right border extending to right border of sternum. Upper border of heart dulness begins at third rib. Liver dulness stops two inches above the central margin in mid-clavicular line. Whole left chest from spine of scapula down is dull on percussion. Tubular breathing over whole lower lobe. About 11 o'clock face and hands became cyanosed. Respiration and heart's action much embarrassed. Radial pulse scarcely perceptible. Under influence of oxygen and hypodermic of camphor condition improved, and patient broke out into a heavy sweat. Continued to perspire all day, and he seemed somewhat better during the afternoon. At about 7.30 P.M. he grew rapidly weaker and died at 8.30 P.M. Temperature before death rose to 108°.

In the following case the absence of positive symptoms of typhoid fever while the patient was at the hospital, and the absence of a marked Widal reaction at any time, would have rendered the diagnosis doubtful. The post-mortem findings appeared, however, to show pretty conclusively that the patient was convalescing from that disease, and I have, therefore, felt justified in including the case in my list.

CASE IV.—H. C. G., aged six years, colored, was admitted to the Episcopal Hospital on January 19, 1901. Patient had been ill for three weeks, complaining of pain in chest and abdomen, and had vomited almost all his food for the past ten days. His bowels were constipated. He had been very drowsy. Had had severe epistaxis for three days. Temperature on admission 104°. His tongue was heavily coated, the mucous membrane of his pharynx much congested, and his tonsils were swollen. A few moist râles were heard over the bases of both lungs. The apex-beat of his heart was in the sixth space within the nipple line, and a soft systolic murmur was heard over the body of the heart. There was tenderness in both iliac fossæ. Liver and splenic dulness normal; no rose spots. Stools frequent, loose, dark brown, and contained some greenish flakes and curds.

January 22d. Had severe nose-bleed last night, losing three to four ounces of blood. Widal reaction negative. No leucocytosis.

27th. Widal still negative. Apparently slight leucocytosis. Urine normal.

30th. Temperature has been normal or subnormal at times during the past two days, with slight febrile exacerbations. Stools dark and partly formed.

February 4th. Leucocytes, 20,000. Heart and lungs negative. No abdominal symptoms. Throat tender externally. Severe epistaxis occurred several times, and it became necessary to pack the nasal cavities.

6th. Thin, clear discharge appeared from the right ear this morning. Had complained of pain in this ear for twenty-four hours previously.

7th. Ear still discharging profusely. Abdomen and chest negative.

8th. Complained this morning of intense pain in the left ear. Vomited milk once to-day.

9th. Still complains of ear, and also this morning for the first time of severe pain in chest. His temperature at 1 o'clock rose to 105.5° and his respiration to 40. Fine moist râles were heard over both lungs, and tubular breathing heard over the whole of the lower lobe of the right lung. Abdomen rigid and tender. Pulse became rapidly weaker, and he died at 8.45 on the morning of February 10th.

Autopsy. Both pleural cavities contain about one pint each of clear serum; the right also some lymph flocculi. The right lung was the seat of croupous pneumonia, involving the lower lobe of the apex of the upper lobe anteriorly. Plastic lymph on visceral pleura over consolidated area, and there was a gelatinous puriform collection anteriorly between the lobes.

Pericardial cavity contained a normal amount of clear serum, but there were numerous bright-red petechial spots in the visceral layers of the pericardium and on the outer surface of the heart.

Liver shows cloudy swelling.

Spleen firm and not much swollen.

Kidneys show cloudy swelling.

Intestines. Peyer's patches swollen, some resembling typhoid ulcers at an early stage of the disease, and others presenting the appearances commonly seen in the seventh, eighth, or ninth weeks after typhoid. The mesenteric glands and solitary follicles were also considerably enlarged.

Brain weighed forty-nine and one-quarter ounces, and there was a small subdural hemorrhage over the median fissure in the parietal region

REVIEWS.

A System of Physiologic Therapeutics. A Practical Exposition of the Methods Other than Drug-giving Useful in the Treatment of the Sick. Edited by Solomon Solis Cohen, A.M., M.D., Professor of Medicine and Therapeutics in the Philadelphia Polyclinic; Lecturer on Clinical Medicine at the Jefferson Medical College, etc. Vols. I. and II., Electrotherapy, by George W. Jacoby, M.D., Consulting Neurologist to the German Hospital, New York City; tō the Infirmary for Women and Children, etc. In two books. Book I., Electrophysics. Book II., Diagnosis, Therapeutics. Illustrated. Philadelphia: P. Blakiston's Son & Co.

In bringing out the first system bearing upon the therapeutical measures other than the administration of drugs which are at the command of the physician, the editor has coined a most expressive title, "Physiologic Therapeutics," which is to be commended as expressing much in few words. Dr. Cohen has prefaced the series with an interesting "Foreword," written in the philosophical manner so characteristic of its author, and detailing the plan to be pursued in the issuance of the work. We think he has done wisely in "preferring compact books by single writers to bulky tomes of composite authorship." Dr. Johnson said that the books one could hold in one's hand were the best, and there is no doubt that ease of handling renders a book more apt to be consulted. It is a pity that the volumes, however, were not made of lighter material, as they are of considerable weight for the amount of matter they contain.

The first two volumes are by Dr. George W. Jacoby, of New York, and deal with that most interesting and complex subject, electrotherapy. Dr. Jacoby begins with a very lucid and concise exposition of the principles of electrophysics. The reviewer knows from practical experience as a teacher how little the average medical student knows concerning the elemental laws of electricity, and how hard it is to attempt to teach him its therapeutical applications unless he possesses some knowledge previously acquired. Dr. Jacoby's book is, of course, unsuitable for use by the student, but it will prove of the greatest value to the teacher as a guide in his work of instruction. Dr. Jacoby does not fill up his pages with discussions of theories and problems, but gives a description of the various ways of obtaining electricity, the varieties of electrical apparatus, and the physical results produced by the different methods of applying the current.

In the second volume the physiological effects of the electrical current on the different organs and tissues of the body are first considered, followed by a section devoted to the principles of electrodiagnosis and electroprognosis in diseases of the motor and sensory apparatus. The rest of the book is devoted to the direct application of our knowledge of electricity to the treatment of pathological conditions, including chapters on its surgical uses, by John Chalmers Da Costa; its use in ophthalmology, by Edward Jackson; in diseases of the nose, throat, and ear, by W. Scheppegrell; in gynecology, by F. H. Martin, and in dermatology, by Ohmann-Dumesnil. X-ray therapy is considered in all its most recent aspects.

These two volumes form a most complete, accurate, and up-to-date presentation of electrical science in its relation to medicine, and as such must possess the greatest value to all medical men, whether they have electrical appliances or not. No physician can afford to ignore the vast and constantly increasing part which electricity is taking in the study and treatment of disease, and in these books the sum of our knowledge is readily obtainable in an interesting manner. F. R. P.

ESSENTIALS OF THE DISEASES OF CHILDREN. By WILLIAM M. POWELL, M.D. Third edition. Thoroughly revised by ALFRED HAND, JR., M.D., Dispensary Physician and Pathologist to the Children's Hospital, Philadelphia. 12mo., 259 pages. Philadelphia and London: W. B. Saunders & Co.

THE third edition of this useful volume has been amended and revised so that it fully maintains its standing as a compend of the science of pediatrics. The revision has been ably conducted so as to retain the character which has caused the book to become popular and yet to introduce into it all that recent progress has made necessary.

G. M. C.

PRACTICAL HYGIENE. For Students and Practitioners of Medicine and Medical Officers. By CHARLES HARRINGTON, M.D., Assistant Professor of Hygiene in Harvard Medical School, Boston. In one very handsome octavo volume of 718 pages, with 105 engravings, and 12 full-page plates in colors and monochrome. Philadelphia and New York: Lea Brothers & Co., 1901.

THE first two hundred pages of this work are devoted by the author to a consideration of foods. He takes up severally the meats, vegetables, fruits, wines, beers, spirits, etc., that enter into diet generally, and studies them from the physiological and hygienic side, treating also of their toxic properties under certain conditions.

The important subjects of the transmission of disease by meat, fish, milk, and the importance of proper regulations in regard to meat inspection and slaughtering are given most full treatment.

Under the heading of cases illustrative of poisoning by fish and meats, the author cites many interesting cases of epidemics of poisoning due either to direct bacterial poisoning or to the toxins already formed before ingestion of the food. The question of milk as a factor in the spread of disease is particularly interesting, and is dealt with very fully. The various adulterations of food products are also discussed, and the chemical and physical means for their detection.

Under the chapter devoted to air the author takes up the study of the composition of the air, the changes that occur in it from natural as well as from artificial causes, the effects of bad air, and the part played by it as a carrier of infection. In addition there is considerable space devoted to the examination of air, the determination of the amount of carbolic acid, carbon monoxide, aqueous vapor, and bacteria. In studying the soil as a factor of diseases, the author is most clear and interesting in his statements.

Many diseases which formerly were considered as soil diseases have been proved to have but an indirect relation at most, and perhaps even no connection whatever to it. To quote the author on this subject: "Our actual knowledge of the relation of soil to disease amounts in brief to this: that surface dampness is favorable to the development of certain diseases, as rheumatism, neuralgias, and affections of the respiratory tract; that the soil is the home of many species of organisms, some of which are pathogenic, and offers under certain favorable conditions at least temporary asylum to others.

"But the preponderance of evidence thus far goes to show that under normal conditions the soil is more likely to prove hostile than hospitable to most of the infective agents with which we are well acquainted."

Under water the author takes up a thorough study of the classification of waters, and their hygienic values for drinking purposes, the substances found in water, the various sources of supply, the methods of filtration on large and small scales, the disorders connected with organic pollution, and the most important question of the influence of water in carrying infections, especially those of typhoid fever and cholera—the two diseases, epidemics of which have been most conclusively traced to infected water supplies.

Various examples illustrative of the part played by water in causing epidemics of typhoid fever are quoted, with the abrupt improvements instituted by the adoption of filtration methods. It is interesting to note that the introduction of sanitary measures with a view to control the dreadful outbreaks of cholera in India are handicapped, and, indeed, rendered almost impossible because of their conflict with the religious customs of centuries, which demand that the natives shall drink water which may have previously been bathed in by large numbers of people as well as used as a wash-tub for filthy clothing and a burial-place for dead bodies.

The values of chemical and bacteriological examinations of water are discussed and the disappointing results mentioned in not finding pathogenic germs in water known to be the cause of disease. Considerable space is given to the study of habitations, schools, etc., with the problems of heating, ventilation, and plumbing and the disposal of sewage and garbage.

The following two chapters are devoted to the subjects of disinfectants and disinfection, quarantine and the quarantine laws.

The author gives a considerable space to the discussion of formaldehyde which has recently come into such general use as a disinfectant, giving the methods of use, the various kinds of apparatus in use, the germicidal properties, and the conditions favoring its action, together with the details of the quantities per cubic foot necessary for thorough disinfection.

Military and naval hygiene as well as tropical hygiene have become matters of unusual importance since the beginning of our war, and the acquisition of new territory. Under these heads the author takes up consideration of the examination of recruits, clothing of soldiers, their food, the diseases common to them, the study of the location of posts and camps, the ventilation and general hygiene on shipboard, and the rules that should be adopted to preserve health and avoid epidemics in tropical countries for civilians as well as for soldiers.

Chapters on hygiene of occupation, vital statistics, personal hygiene, vaccination, and disposal of the dead complete the work. *Practical Hygiene* should prove a valuable work to students, medical officers, and general practitioners, and a book of reference in all things pertaining to sanitary matters.

The author states in his preface that he has advisedly left out a chapter on elementary bacteriology, which has commonly been introduced of late into works on hygiene, claiming—we think, justly—that that subject is distinct in itself and generally taught either separately or in connection with pathology. J. N. H.

RUDIMENTS OF MODERN MEDICAL ELECTRICITY, ARRANGED IN THE FORM OF QUESTIONS AND ANSWERS PREPARED ESPECIALLY FOR STUDENTS OF MEDICINE. By S. H. MONELL, M.D. Pp. 165. New York: Edward R. Pelton, 1900.

THIS little book is intended as a quiz compend to supply medical students with the essential facts regarding the uses of electricity in medicine. We think it is very adequately adapted for that purpose, although, of course, not answering the uses of the larger text-books on medical electricity. A number of well-executed illustrations accompany the text. G. M. C.

A REFERENCE HANDBOOK OF THE MEDICAL SCIENCES. Embracing the Entire Range of Scientific and Practical Medicine and Allied Science by Various Writers. A new edition completely revised and rewritten. Edited by ALBERT H. BUCK, M.D. Vol. I. New York: William Wood & Co.

IT is with somewhat the same feeling of pleasure with which one greets an old friend that it becomes our privilege to review the first two volumes of the new edition of the *Reference Handbook of the Medical Sciences.* We know of no undertaking of its kind which reflects more credit upon the publishers and the authors than this encyclopedic work. The individual articles are the work of men of recognized authority in the various subjects of which they treat. Each of the articles which appeared in the former edition has been so carefully edited and brought up to date that they all are practically rewritten. The many new subjects brought forward during the years which have elapsed since the *Reference Handbook* was first published are adequately treated of, and in a careful search we have been unable to find anything of real value in the recent progress of medicine which should have been included, left out.

One of the most valuable series of articles in the first volume is that which deals with the various matters appertaining to the army medical service. Among the authors dealing with these important topics we find such authorities as Surgeon General Sternberg, Colonel Charles Smart, Captain Edward L. Munson, and Dr. Anita Newcomb McGee.

In the second volume, probably the most noteworthy contributions are those dealing with the brain and blood, Dr. W. W. Keen contributing the article on cerebral surgery, and Dr. M. Allen Starr that on the diagnosis of local brain lesions. The anatomy and histology of the brain are very thoroughly discussed by Dr. Burt. G. Wilder, and his work is rendered of particular value by the accurate and clear illustrations by which it is accompanied. The articles on the blood are valuable for their thoroughness and the care with which all the most recent methods of blood examination are detailed. Drs. Camac and Hektoen have elaborated their work on this subject so as to make it of the greatest use to all those who may find occasion to consult this book as a guide in their laboratory work. The two volumes cover the letter A and a large part of the letter C. An important feature which renders the *Reference Handbook* of especial value is that all of the leading articles are signed by their authors. F. R. P.

A SYSTEM OF PRACTICAL THERAPEUTICS. By Eminent American and Foreign Authorities. Edited by HOBART AMORY HARE, M.D., Professor of Therapeutics, Jefferson Medical College; Physician to Jefferson Medical College Hospital, etc., Philadelphia. New (second) edition, thoroughly revised. In three handsome octavo volumes, containing 2593 pages, with 427 engravings and 26 full-page colored plates. Philadelphia and New York: Lea Brothers & Co., 1901.

THE medical profession is already familiar with Hare's *System of Practical Therapeutics*, which was published ten years ago. In this edition nearly half the chapters are entirely new, and the remaining articles have undergone a most thorough revision. Among those subjects which have thus demanded new presentation may be mentioned diabetes mellitus, diphtheria and spasmodic croup, scarlet fever, measles, rötheln and varicella, typhoid fever, croupous and catarrhal pneumonia, dengue, influenza, acute articular rheumatism, and tonsillitis, mumps and diseases of the mouth, diseases of the liver and gall-bladder, tuberculosis, rickets, scurvy, the diseases of pregnancy, parturition and the puerperium, fractures and dislocations, antisepsis and asepsis, anæsthetics, minor surgery and bandaging, disinfection, mineral springs, Swedish movements and massage.

The first volume of the *System* contains twenty contributions on remedial measures other than drugs: prescribing, preventive medicine, and the treatment of diathetic and nutritive diseases.

The second volume deals with the treatment of fevers, skin diseases, the respiratory, circulatory, renal, and nervous systems, and is divided into twenty-nine chapters, contributed by twenty-five well-known authorities, almost all of whom are teachers of the subject on which they write. Ten of the chapters are entirely new, the rest have been overhauled and carefully amended. It is written from a bedside standpoint, in lucid terms, which, though not dogmatic, are sufficiently positive and convincing to guide rather than direct. It is a work calculated to make the reader think, containing exercises for his judgment. A drug is not recommended for a symptom, but the cause of complaint is diligently sought, removed if possible, and the effect is combated with an eye to the individual as well as to the disease. An effort is made to inculcate rational instead of routine treatment, to smooth ruts with reason, and to append to each recipe brains quantum sufficit. Hare well says that "the curse of therapeutics is the fact that physicians do not think for themselves, but blindly follow some method." Archaic procedures and untried novelties, with a few justifiable exceptions, are excluded.

The third volume embraces anæsthesia, surgical technique, fractures, dislocations, minor surgery, surgery of the lungs, pleura, peritoneum, rectum, and anus; diseases of the genito-urinary apparatus, pregnancy, parturition, and the puerperium, and diseases of the eye, ear, and upper respiratory tract.

C. L. Leonard contributes the article on anæsthetics. He urges the use of ether in almost all cases, stating that "the reasons for using chloroform narrow themselves down in the majority of cases to the self-interest of the operator in saving time." Chloroform, ethyl bromide, and medullary narcosis are not discussed, and the writer fails to mention the sloughing which sometimes follows the use of eucaine.

The technique of surgery is elaborated in a careful manner by C. H. Frazier. Under surgical bacteriology he confuses leucomaïnes and ptomaïnes. In preparing a case for operation he omits the interrogation of the patient concerning hæmophilia and the blood examination. The former we have had occasion to deeply regret; the latter attains special eminence in the victims of anæmia.

Concerning the treatment of fractures by massage, H. R. Wharton writes that as an exclusive method it has not found its way into great favor. He believes the non-operative treatment of patellar fracture to be the method applicable in the majority of cases, and the ambulatory treatment of fractures to be still on trial, its advantages not being outweighed by its dangers and disadvantages.

We find an admirable disquisition on pleural effusions, abscess and gangrene of the lung, by A. J. McCosh, who maintains that simple thoractomy without costal exsection is sufficient, as a rule, for empyema in children, and that irrigation is often indicated where the pus is foul or large masses of fibrin are present. There is still much missionary work to be done for the surgical treatment of abscess and gangrene of the lung, and McCosh's article will aid in creating a disposition on the part of the physician to persuade his patient to submit to an early operation and not wait until the patient is so saturated with sepsis that any operative procedure would not only be futile but would hasten the lethal exit.

Because peritonitis is almost always a symptom of a grave intra-abdominal lesion necessitating at least exploration, we are not partial to the prominence given its medical treatment by G. R. Fowler; it will lead to pernicious procrastination. His technique for the surgical treatment we believe to be the most efficient. He practices copious irrigation instead of gauze curettage, and after operation places the patient in the elevated head and trunk posture.

The therapeutics of pregnancy, parturition, and the puerperal state, by E. P. Davis, is an excellent paper written with the wonted lucidity of its author.

The three volumes contain numerous well-executed illustrations, which are well chosen for their value in the elucidation of the text. The typography and get-up of the volumes are fully up to the standard of excellence heretofore maintained by this publication. F. T. S.

A COMPEND OF HUMAN PHYSIOLOGY, ESPECIALLY ADAPTED FOR THE USE OF MEDICAL STUDENTS. By ALBERT P. BRUBAKER, A.M., M.D., Adjunct Professor of Physiology and Hygiene in the Jefferson Medical College, etc. Philadelphia: P. Blakiston's Son & Co., 1900.

THIS excellent little work is fully worthy of the success which has brought about the appearance of its tenth edition. Although it does not supplant the larger text-books on the subject, yet it is to be heartily commended as a *vade mecum* for the student. G. M. C.

DISEASES OF THE EAR. By T. MARK HOVELL, F.R.C.S. Edin., M.R.C.S. Eng.; Aural Surgeon to the London Hospital; Consulting Surgeon to the Hospital for Diseases of the Throat, Golden Square; Lecturer on Diseases of the Throat, London Hospital Medical College; Aural Surgeon, British Home for Incurables. Second edition. Philadelphia: P. Blakiston's Son & Co., 1901.

THIS book has been written, as the author states in his preface, particularly for the use of those physicians who give special attention to diseases of the ear. With this in view one cannot but be disappointed by the somewhat scanty space devoted to the consideration of what most aurists regard as the more difficult problems met with in the treatment of such pathological conditions. The book is comprehensive in the number of topics discussed, the defect in our opinion consisting in a somewhat sketchy treatment of the individual subjects. If the author had written a book for students or for occasional reference by the general practitioner, this criticism would not hold.

In the consideration of the aurist's armamentarium there are several assertions made to which many aurists would take exception. Thus we think few would agree to the statements that "the best form of speculum is that which is known as Brunton's," and that "for the removal of tonsils Morell Mackenzie's modification of Physick's tonsillotome is the most suitable instrument." Many of his other statements as regards methods of examination and treatment would be open to objection, but would not be subject to criticism if they were not couched in such positive terms.

With the above exceptions the book is worthy of commendation. The author expresses himself in well-chosen terms and is concise and clear. His high standing as an otologist certainly justifies to a large degree the positiveness of his statements, and the book is one which should be at hand for consultation by those physicians who are especially interested in the subject, for whose behoof it was written.

F. R. P.

STUDIES IN THE PSYCHOLOGY OF SEX The Evolution of Modesty—The Phenomena of Sexual Periodicity—Auto-erotism. By HAVELOCK ELLIS, M.D. Pages xii., 275. Philadelphia: F. A. Davis Company.

THIS work consists of three studies under the headings of modesty, sexual periodicity, and auto-erotism.

The study of the evolution of modesty in animals as well as in man is dealt with in an interesting manner, and the author considers its development in the customs and manners observed in savage and civilized people.

The phenomena of sexual periodicity in women is discussed, and a physiological and psychological rhythm demonstrated.

In men also the author takes up the question of monthly sexual cycles and of a general physiological cycle, and on these subjects an appendix is added by F. H. Perry-Coste, B.Sc.

The greater part of the work is included in the chapter on Auto-erotism, a term apparently coined by the author by which he means "the phenomena of spontaneous sexual emotion generated in the absence of an external stimulus." Under this heading a great variety of subjects are treated, many of which, however disagreeable they may be, are matters of growing importance, and not often as plainly dealt with as herein.

The whole work is carefully written, and shows careful preparation, although we do not see that it would prove of any particular value to physicians in general practice or to others except in special cases.

J. N. H.

EXPERIMENTAL RESEARCH INTO THE SURGERY OF THE RESPIRATORY SYSTEM. An Essay awarded the Nicholas Senn Prize by the American Medical Association for 1898. By GEORGE W. CRILE, A.M., M.D., Ph.D., Professor of Clinical Surgery, Medical Department, Western Reserve University; Surgeon to St. Alexis Hospital, Cleveland. Second edition. Philadelphia: J. B. Lippincott Co., 1900.

THIS very valuable contribution to surgery embraces the results of and the practical deductions obtained from a series of experiments on 102 dogs, all of which were fully anæsthetized before experimentation and killed while still narcotized. It demonstrates the author's infinite capacity for labor, as the work has occupied a period of two years, and has been conducted with the sole desire to arrive at the truth without reference to previous theories or notions.

Crile carefully investigates the cause of the phenomena attending the inhalation of hot air and flame; the cause of certain symptoms observed on entering an atmosphere of increased barometric pressure, and the cause of collapse or death from blows on the lower chest and epigastrium, the evidence presented tending to show that the solar plexus may be disregarded as a factor, and that the real cause of the striking phenomena is the mechanical effect of violence upon either the heart muscle or upon its nerve mechanism. He notes the effect of filling the chest with fluid, the effect of manipulation of the brachial plexus and nerves supplying some of the respiratory muscles, and studies the mechanism of drowning.

From his experiments he learns and teaches practical lessons concerning laryngotomy, tracheotomy, and intubation. He advises spraying the larynx with cocaine to protect against sudden collapse, and the injection of atropine hypodermically to paralyze the nerve endings of the vagi in the heart, so insuring this organ against reflex inhibitory impulses. He points out that sufficient traction on the tongue will cause arrest of the respiratory and cardiac action—a fact to be remembered by an over-aggressive anæsthetizer.

This book has been or will be read by all interested in the surgery of the respiratory system. F. T. S.

THE YEAR-BOOK OF THE NOSE, THROAT, AND EAR. The Nose and Throat, edited by G. P. HEAD, M.D.; the Ear, edited by A. H. ANDREWS, M.D. Chicago: The Year-book Publishers, 1901.

WE are glad to notice the reappearance of this most useful little book. It comprises within its pages an epitome of the most advanced literature on diseases of the nose, throat, and ear, both foreign and American. The abstracts are especially well done, not too lengthy, and yet full enough to give the complete sense of the author. The book is invaluable as an addition to the library of a physician especially interested in the subjects of which it treats. F. R. P.

OBSTETRICS: A MANUAL FOR STUDENTS AND PRACTITIONERS. By DAVID JAMES EVANS, M.D., Lecturer on Obstetrics and Diseases of Infancy, McGill University, Montreal, Canada; Fellow of the Obstetrical Society of London, England. Edited by BERN B. GALLAUDET, M.D., Demonstrator of Anatomy and Instructor in Surgery, College of Physicians and Surgeons, Columbia University, New York; Visiting Surgeon Bellevue Hospital, New York. Pp. 417, with 149 illustrations. Philadelphia and New York: Lea Brothers & Co.

THE author states in his preface that his object in writing this book is to supply to the student and junior practitioner of medicine with a short and concise treatise on the science and art of obstetrics. There are at present many such manuals on the market, but it is seldom that we have seen one in which the subject has been so well handled as in the work before us.

We are particularly pleased with the chapter on embryology, a subject always held in dread by medical students, and one which every author finds difficult to describe in a condensed form. This article, although of necessity brief, is not only well written, but is plainly illustrated. We notice in this chapter that a short description of the syncytium has not been forgotten. The chapters on the diagnosis of pregnancy and the anatomy of labor are especially clear, and are illustrated with good diagrammatic drawings, which are in the majority of cases much more useful for teaching purposes than photographs taken from life. The modern methods of asepsis and antisepsis have all we believe been considered. We note that the author has followed the regulation method of teaching four positions to each presentation. More space, we think, might have been given to the most important subject of the toxæmia of pregnancy, or, as the author has described it, the premonitory symptoms and prophylactic treatment of eclampsia. The complications of the puerperal state have been considered at some length. The book is unusually well illustrated, the printing clear, and the binding attractive. We feel certain that as a manual of obstetrics this book will find quite an extended field of usefulness.

W. H. W.

LECTURES ON NASAL OBSTRUCTION. By A. M. SHEILD, M.D. Philadelphia: P. Blakiston's Son & Co., 1901.

THIS little book is elaborated from three lectures delivered by the author at St. George's Hospital during the year 1900. The lectures were addressed to students, and the little book will find its chief usefulness among students and general practitioners. It contains, however, much of the greatest value to the specialist in rhinology. Based as it is on a large clinical experience, it conveys the gist of the author's conclusions as regards the best methods to use in dealing with pathological conditions of the nasal chambers. There are numerous well executed illustrations, and we think the book certainly deserves perusal by all those who are called upon to treat the condition named in its title.

F. R. P.

THE TREATMENT OF FRACTURES. By CHARLES L. SCUDDER, M.D., Assistant in Clinical and Operative Surgery, Harvard Medical School. Second edition, revised and enlarged. Octavo, 433 pages, with nearly 600 original illustrations. Philadelphia and London: W. B. Saunders & Co.

As a guide to the practitioner and student this work can be heartily commended, although not above criticism in certain chapters. The treatment of most fractures is carefully and comprehensively described, and each dressing illustrated by excellent photographs and drawings.

It is a satisfaction to see the treatment outlined so carefully and so well illustrated that one who might consult the book would find the descriptions easily understood and followed. Seldom have we seen a book in which the illustrations serve their purpose better than in this second edition of Scudder's work. The chapter on fractures of the skull impresses one as being very brief as compared with the number of pages devoted to other fractures, and altogether too brief to serve the purpose just ascribed to the other portions of the book. In his description of the treatment of Colles' fracture the author makes no mention of the Bond splint, an omission which one who is familiar with this dressing would be inclined to criticise. Another omission which we notice is in the treatment of fractures of the leg where the author makes no reference to the fracture box, although he does describe Cabot's dressing of a posterior and two lateral splints which very closely resembles the fracture box. A number of X-ray pictures have been added to the work in an attempt to familiarize the reader with the proper interpretation of X-ray plates. It is a disappointment to find at the end of so excellent a volume so unsatisfactory an index. J. H. G.

NURSING ETHICS. By ISABEL HAMPTON ROBB. Cleveland: J. B. Savage, 1900.

A TEXT-BOOK on the subject of nursing ethics has been greatly needed in hospital training schools, too little attention having been given to this very important part of the nurse's training, and all nurses, whether they be graduates or still in training, should avail themselves of this valuable addition to the books written for their benefit and instruction.

Mrs. Robb has thought her subject out carefully, has said just what is wanted, and has said it well. She has written in a systematic way, giving special attention in turn to the probationer, junior nurse, senior nurse, and to the graduate, both as head nurse and on private duty. In thus grouping them she has supplied superintendents and other nurse teachers with a most excellent text-book which may be used with advantage during the entire term of training.

In the opening chapter the writer mentions the great need for a code of ethics in the nursing profession.

"I am convinced that many a woman's success, either as a pupil or as a graduate nurse, is wrecked not for lack of knowing how to do her work well, but from her ignorance or neglect of the practical application of the ethical side of her profession.

"Only rarely does one hear criticisms directed against the purely practical work of a nurse; on the other hand, the ethical side is being constantly attacked and too frequently, I fear, with sufficient cause."

A brief sketch of nursing history is next given, showing how wonderfully improved has been the care of the sick since the advent of the modern trained nurse in 1873, when Sister Helen came over from England to take charge of the Nurses' Training School attached to Bellevue Hospital, New York. This is followed by an enumeration of the necessary or desirable qualifications to be possessed by the would-be nurse which are summed up in well-chosen terms.

The different virtues which should be especially emphasized in the training of a nurse are well brought out, such as obedience, discretion, and faithfulness to trust. The graduate nurse in private duty receives perhaps a larger share of the writer's attention than is necessary, as the hints on the methods of work should properly find their place in a book on practical nursing. As a pioneer work of its class the book deserves great praise, and should be certainly read by not only nurses but those who are interested in the nursing profession, such as physicians and hospital managers. No one is better qualified for the task than the author, and she is to be congratulated on the result of her labors.

L. W.

THE FEEDING OF INFANTS. A HOME GUIDE FOR MODIFYING MILK. By JOSEPH E. WINTERS, M.D., Professor of Diseases of Children, Cornell University Medical College. Pp. 47. New York: E. P. Dutton & Co.

THIS little book seems to be a brief description of the most commonly used methods for the home modification of cow's milk for infant feeding. It appears to be intended more for the instruction of mothers and nurses than for the medical profession. Many of the methods of milk modification are briefly described, and a number of tables are used.

W. H. W.

THE DIAGNOSIS AND TREATMENT OF DISEASES OF THE NOSE, THROAT, NASOPHARYNX, AND TRACHEA. For the Use of Students and Practitioners. By CORNELIUS G. COAKLEY, M.D., Professor of Laryngology in the University and Bellevue Hospital Medical College, New York. New (second) edition. In one handsome 12mo. volume of 556 pages, with 103 engravings and 4 colored plates. Philadelphia and New York: Lea Brothers & Co., 1901.

THE first edition of this excellent little manual has already been reviewed by the writer at considerable length in the pages of the JOURNAL. The short time which has elapsed before a second edition has become necessary speaks for itself as to the value of the book. The present edition has been somewhat enlarged, thoroughly revised, and two accurate as well as handsome colored plates added. Its usefulness as a manual for the student or for those who do not desire the larger text-books on this subject is very great. The views expressed on various subjects are those which meet with the most general acceptance, and the author's discussion of the various topics is not obscured by advancing theories which only serve to confuse the minds of students, for whom this book is primarily intended. Particularly to be commended is its handy size and shape and the lightness of the book. Although it contains 566 pages, it can be readily carried and lends itself to easy reference.

F. R. P.

PROGRESS

OF

MEDICAL SCIENCE.

MEDICINE.

UNDER THE CHARGE OF

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General Infection Following Gonorrhœa.—ULLMANN (*Deutsch Arch. für klin. Medicin*, 1901, lxix., 309) reports five interesting cases observed during six months in the medical clinic of Greifswald. The first case was one which was clinically regarded as a cryptogenetic septicæmia. On autopsy, however, it was found that an unrecognized gonorrhœa of several months' duration had been followed by a prostatic abscess without symptoms during life. This resulted in a septic thrombosis of the prostatic plexus and a subsequent pyæmia. The second case was one of extremely severe general infection in which, during life, typhoid fever had been suspected. On autopsy, however, there was found a staphylococcus abscess of the prostate which had been followed by pyæmia. No changes in the urethra were made out, but the abscess was probably the result of a previous gonorrhœa. The third case was also one of gonorrhœa followed by prostatic abscess and pyæmia, although, at the time of entry, no urethral discharge was present. A secondary periorchitic abscess was recognized during life, but the suppurative prostatitis was not suspected. The fourth case was also an instance of prostatic abscess followed by cystitis and pyæmia, in which, *intra vitam*, the prostatic changes were thought to be malignant. There was no evidence of gonorrhœa in this case, but the author believes it probable that an urethritis was the starting-point of the process. In addition to these cases, Ullmann reports an instance of general septicæmia, pericarditis, and ulcerative endocarditis following gonorrhœa with arthritis.

The author reviews the literature concerning various metastatic, secondary, and mixed infections which may follow gonorrhœa, and calls particular attention to the importance of suspecting gonorrhœa, and especially prostatic abscess, as a possible cause of septicæmia and pyæmia without apparent point of origin. These cases emphasize the fact that a prostatic abscess resulting in the gravest complications may be of moderate size, and may give rise to few, if any, local symptoms. In the words of the author, "It is strongly to be recommended, in all cases of cryptogenetic septicæmia in men, that a careful examination of the prostate should be made, even in the absence of a history of gonorrhœa, and without pathological manifestations in the external genitalia or in the urine."

The Causal Element of Vaccinia and Variola.—FUNCK (*Deutsch Med. Wochenschrift*, 1901, xxvii., 130), in a preliminary report of studies carried out in the Sero-therapeutic Institute of the University of Brussels, states that he has convinced himself of the following facts:

1. Vaccinia is not a bacterial disease.
2. Vaccinia is a protozoal infection. The causal agent is easily examined in all vaccinial pustules and in active lymphs.
3. The inoculation of these parasites in a sterile emulsion brings about in animals all classical appearances of vaccinia.
4. The inoculation of this emulsion makes the animals resistant against further inoculation of vaccine.
5. The pustules of variola contain a protozoon which is similar, morphologically, to that of vaccinia.
6. As a result of these experiments it is shown that variola and vaccinia are two identical affections; that vaccinia is only a milder form of variola, and that, as a result of this, the anti-variolic immunity which is established by vaccination comes entirely under the general laws of specific immunity.

It has been shown that lymphs preserved in glycerin and proven to be absolutely sterile in all ordinary culture media may yet remain characteristically active, a fact suggesting that the activity is due to some organism other than a bacterium.

In fresh lymph characteristic elements are to be found, doubtless identical with those originally described by L. Pfeiffer, and clearly corresponding to large egg-shaped non-staining vacuoles which are seen in dried specimens.

There are to be found:

1. Refractive structures of a glistening green appearance, from 2 to 10μ in size, which show slow but characteristic movements at 37° C.
2. Egg-shaped cells which, more or less elongated, show a laterally placed nucleus and, in the protoplasm, fairly rounded clumps of glistening spheres which are similar to the before-described elements, and are from 1 to 3μ in diameter.
3. Finally, and most abundantly, there are to be found in all lymphs yet larger structures, often rounded, and 25μ in diameter, with or without double contour, sometimes egg-shaped and 30 to 35μ in length by 20 to 25μ in breadth. These, he believes, are cysts (sporoblasts), full of spores, in which the nucleus appears in the shape of a voluminous clear spot, sometimes in the middle, sometimes upon one side. These cysts have sometimes a pear-shape, and are found in the contents of pustules, in tubular accumulations which are of greater or less length and may consist of twenty to forty elements.

In old lymphs these last forms are more frequent, while in the fresh extracts of pustules the first are commonest, swimming between the pus corpuscles. Funck suggests that the organism be called *sporidium vacciniale*.

In a hanging drop it is found that, while the leucocytes fall to the lower part of the drop, the protozoon is to be found upon the under side of the cover-glass.

These structures are so large that the author has been able, with a very fine spatula made of platinum wire, under low powers, to actually separate individual elements. These, after being washed twenty to thirty times in a drop of bouillon, still produce, when inoculated into calves, typical pustules on the sixth day, the animal acquiring also a characteristic immunity. Similar structures are found in the pustules of true variola.

This observation relates unquestionably to elements which have been noted by a number of other students. The inoculation experiments, after apparent separation of individual organisms, are especially interesting, and further reports may be looked for with considerable interest.

Observations on Experimental Vaccinia.—CALMETTE and GUÉRIN (*Annales de l'Inst. Pasteur*, 1901, xv., 11) repeated some of the studies of Gailleton and Bard and Leclerc in the hope of finding a method to control with precision the virulence of vaccines of different origin and age. They confirmed the observations of these authors in showing that the rabbit was subject to vaccinia. By repeated experiments they became convinced that the rabbit is less susceptible to vaccinia than calves or children, which suggested to them that this animal might be employed for control of the virulence of various vaccines. At present all vaccines passing through the Pasteur Institute at Lille are tested on two rabbits before being distributed. A vaccine which is virulent for the rabbit is sure to be satisfactory in a human being.

In some experiments upon a vaccinial immunity in the rabbit they show that this is produced, however the vaccine is introduced, in from five to six days. But observations appear to show that the infectious agent, whatever it may be, does not multiply in any organ to which the leucocytes have access, with the exception of the cutaneous surface. The lesion of the skin is indispensable for the implantation and evolution of the vaccine.

They have further carried on various experiments concerning the possibility of cultivating the virulent agent of vaccinia without success. They note, however, that when one examines microscopically with the highest powers lymph obtained with every possible antiseptic precaution on the fourth day, there are found very few bacteria stainable by ordinary methods, but when examined unstained many very minute refractive motile granules are to be made out. These they suspect may be the infectious agents of vaccinia, especially as they are never to be found in the blood or in exudates met with in animals with vaccinial eruption. In glycerinized vaccinial pulp these granules are larger and immobile. It is also to be noted that the better the quality of the vaccine the more numerous they are. After one has become accustomed to the microscopical study of vaccines, one may affirm almost with certitude that the vaccine will be good or bad according to the number of these refractile free granulations. Cultures, unfortunately, have been without result.

It was difficult to obtain vaccine free from other organisms capable of growth in artificial media, and yet capable of developing pustules when inoculated upon the freshly shaven skin. Glycerin does not entirely free the serum from other micro-organisms. The authors, however, have adopted an ingenious and apparently satisfactory method of purifying vaccine. After injecting 10 to 20 c.c. of bouillon into the peritoneum of a rabbit so as to provoke an exudate, they introduce four or five hours later a small quantity of freshly glycerinized vaccine in 1 c.cm. of bouillon. After four hours, by puncture or by killing the animal, the exudate is removed. In cultures this is generally found to be apparently sterile, but capable of producing a few pustules when introduced under the skin of a rabbit. The infectious agent of vaccine has not then multiplied in the peritoneum of the rabbit, but the other bacteria have been removed, while the organism of vaccine has been, at least in part, spared. They endeavored to suppress the effects of dilution by introducing vaccine, not into the prepared peritoneum of a new rabbit, but into that of a rabbit at the height of the vaccinial eruption on the third day. After three and a half hours they obtained exudates which, when tested on new rabbits, produced confluent eruptions and yet gave no growths in artificial media. But often, especially on introducing into the peritoneum glycerinized pulp instead of the fresh pulp, the exudates, after four hours, are no longer virulent and give but a few pustules. They tried without success to cultivate aseptic vaccinial exudates in collodion sacs or by successive passages from peritoneum to peritoneum in rabbits at the height of the vaccinial eruption on the third and fourth day. They were, however, unable to obtain a multiplication or culture of the virulent elements of vaccine in the normal exudates of the rabbit, but by allowing vaccines to remain for a greater or less length of time in the peritoneum of prepared animals, aseptic sera may be obtained, vaccines which contain no micro-organisms capable of growth in artificial media, but are yet capable of producing vaccinial pustules and immunity. They conclude:

1. The inoculation of vaccinia to the rabbit is always followed by a confluent eruption of small pustules very rich in lymph, if one take the precaution not to insert the vaccine in scarifications, but simply to spread the virulent substance upon freshly shaven skin.
2. The rabbit is an excellent control animal, permitting the verification of the virulence of vaccines obtained from calves or children, as well as that which has been preserved for some time in glycerin.
3. The multiplication of the virulent elements of vaccinia does not appear to take place in the rabbit in any other organ than the skin.
4. Aseptic vaccines may be obtained—that is, vaccines giving rise to no development of bacteria in artificial media, as a result of purification by a sojourn of several hours in the peritoneum of rabbits prepared by a previous injection of bouillon. The leucocytes then make away with the foreign micro-organisms, respecting for a longer time the virulent elements of vaccinia.

Obstetrical Paralysis, Infantile and Maternal.—Obstetrical paralysis is of interest to the physician as well as to the obstetrician. THOMAS (*Johns Hopkins Hospital Bulletin*, November, 1900, p. 297) reports two cases in mothers and three in babies. In one instance a mother and baby were paralyzed in the same labor. In the infant the paralysis is that known as

Duchenne's obstetrical paralysis of the arm, in which the deltoid, infraspinatus, and flexors of the forearm are affected. This paralysis is characterized by falling of the arm close to the side of the body, the rotation of the arm inward and the extension of the forearm on the arm. The views concerning the etiology of this paralysis have changed in recent years. The early view was that, from various obstetrical procedures, the roots of the fifth and sixth cervical nerves were injured by pressure. The point above the clavicle where this pressure is exerted is known as Erb's point. Erb claimed that the injury was most often due to the so-called "Prager Handgriff," in which the finger is placed above the clavicle and pressure made directly over the point that he described. The view now generally accepted is that the injury results in most cases from mere stretching of the fifth and sixth cervical roots resulting from undue traction on the neck with lateral flexion during labor. This view was first advanced by Carter and later supported by Walton and Tieux. Shoemaker thinks that in breech presentations the cervical nerve roots are occasionally injured by being pressed between the clavicle and cervical spine.

The head presented in all three of Thomas' cases. Forceps were used twice. The cause of the injury to the brachial plexus was definitely determined in only one case; in this there had been traction on the head with strong lateral flexion of the neck, and the injury was undoubtedly due to stretching of the nerve roots. Accidental death occurred in one case nine weeks after birth, the paralysis not having improved. The other two cases entirely recovered. Thomas considers this very satisfactory, as he has seen a number of cases that have persisted until late life. The prognosis depends on the severity of the injury.

The injuries to the nerves of the mother during labor are of even greater interest. Hünermann, who reported four cases and reviewed the literature, determined that the paralysis resulting from trauma during labor nearly always affected exclusively or most intensely the muscles supplied by the external popliteal nerve. This is due to the fact that this nerve receives its fibres mostly from the fourth and fifth lumbar roots. These unite, forming the lumbosacral cord, which passes over the brim of the true pelvis and lies next to the bone, thus being freely exposed to pressure. In the two which Thomas reports labor was difficult and instruments had been used. In one case the pelvis was normal and the child large; in the other the pelvis was generally contracted and the child was very large. In one case the right leg was alone affected, while in the other both legs were involved. The paralysis in both patients was most marked in the muscles supplied by the external popliteal nerve. There was, however, a certain amount of weakness in the other muscles supplied by the sciatic nerve. Thomas draws attention to the fact that paralysis of both legs, as in his second case, is a very unusual occurrence, and he has never met with a description of a similar case. The occurrence was considered still more remarkable in that this patient was the mother of one of the three infants with the Duchenne paralysis.

Windscheit, under the title "neuritis gravidarum und neuritis puerperalis," divides puerperal neuritis into four classes:

1. Certain cases which have developed during pregnancy (neuritis gravidarum) and have persisted after confinement. The etiology of these rare

cases is not known, but they are supposed to be due to the action of some poison circulating in the blood. The clinical picture is that of a pure motor form of neuritis. No special nerves are liable to be affected.

2. Neuritis due to puerperal infection. Here the neuritis is purely local, due to the extension of the inflammatory exudates, so as to involve the pelvic nerves. This form has long been known.

3. Puerperal neuritis due to traumatism during labor. The cases reported by Thomas belonged to this class.

4. Puerperal neuritis (Mœbius). These cases develop in women in whom pregnancy and confinement have been perfectly normal, and in whom there has been no pathological process to which the affection could be traced. There are two forms: (*a*) The localized forms in which only one or two nerves are affected. The prognosis is not entirely good. (*b*) The generalized form, in which the paralysis develops in many nerves at the same time, and often after the manner of Landry's paralysis—*i. e.*, the ascending type. The prognosis is even graver in this form.

Thomas suggests that paralysis occurring in women and infants due to injury during labor be called obstetrical paralysis, and the adjectives, maternal and infantile, be used to distinguish the two conditions. Thus maternal obstetrical paralysis or obstetrical paralysis of the mother and infantile obstetrical paralysis (Duchenne), or obstetrical paralysis of the infant.

Polyorromenitis, or Combined Serous Inflammations.—TAYLOR (*British Medical Journal*, December 15, 1900, p. 1693) in a clinical lecture on combined serous inflammations uses the term polyorromenitis to indicate this condition. We are indebted to the Italian physicians for the term. They have made a special study of these combined serous inflammations in recent years, and have also made use of the term polyserositis. Taylor prefers the term polyorromenitis to polyserositis, as it is of purely Greek derivation. The word ὀρρός in Greek means serum.

The writer gives the histories of two cases of polyorromenitis. In the first case the peritoneum and pleuræ were involved, and tuberculosis was considered the etiological factor. The second case was more acute, and the pericardium was involved in addition to the other two serous membranes. From the history of the case the polyorromenitis was attributed to one of the pyogenic organisms, although no statement was made as to any cultures having been taken at autopsy.

Taylor takes up the etiology of multiple serous inflammations, and divides the cases clinically into the acute, subacute, and chronic forms. The pyogenic organisms are the cause of most of the acute cases, the pneumococcus, streptococcus, and staphylococcus being most frequently found. The organism or poison of rheumatic fever is another cause. The tubercle bacillus is the commonest cause of the subacute and chronic cases.

The analyses of tuberculous polyorromenitis cases made by the Italians show that it is commoner in males than in females, and that the majority of cases occur between the ages of sixteen and thirty. Usually one serous cavity is invaded before the others, and in most cases it is the peritoneum that is first attacked. The interval between the invasion of the different serous membranes may be a few weeks or some months. The duration is variable. The result may be recovery with adhesions, or it may be a fatal termination in phthisis.

The prognosis of acute polyorromenitis is much graver than that of the subacute and chronic forms. Many of the cases due to pneumococcus die. A still larger number are fatal when caused by the staphylococcus or streptococcus. The prognosis in the subacute and chronic forms, the vast majority of which are due to the tubercle bacillus, is much more favorable. Many cases recover. The figures given by Picchini show that out of fifty cases of tuberculous polyorromenitis there were twenty-two deaths, seven were improved, and twenty-one were cured.

Aneurism of the Aorta Treated by the Insertion of a Permanent Wire and Galvanism (Moore-Carradi Method).—The method described by HUNNER (*Johns Hopkins Hospital Bulletin*, November, 1900, p. 266) is a modification of the Moore process of introducing wire into the aneurismal sac, in which Carradi advocated the passing of an electric current through the wire after its introduction, thus causing an increased liability to the deposition of fibrin within the sac and upon the wire. Hunner experimented in order to find the best means of insulating the needle to prevent loss of the current where the needle passes through the sac wall. He found that the best French lacquer made the most suitable insulator. Wire containing seventy-five parts of copper to 1000 of silver made the best alloy, and permitted of the most satisfactory coiling within the sac. About ten feet of wire are passed into the aneurism. In passing the electricity into the sac the positive pole is connected with the wire and the negative pole with a metal plate at the back. A current of 10 ma. is passed into the sac for about one hour. In the case of aneurism of the abdominal aorta the abdomen has to be opened and the sac wall exposed. In aneurism of the thoracic the needle is inserted through the skin into the sac, using cocaine or ethyl chloride as a local anæsthetic.

Hunner has collected all the cases in which the Moore method of wiring alone was used, as well as all the cases in which wiring and electrolysis were combined. The combined (Moore-Carradi) method had been used in five cases at the Johns Hopkins Hospital.

Fourteen cases have been treated by the Moore method alone. Of these 8 were thoracic and 6 abdominal. Two cases, both abdominal aneurisms, resulted in cures. With the combined method (Moore-Carradi) there have been 23 cases, 17 thoracic and 6 abdominal. Four of these, or 17 per cent., 3 thoracic and 1 abdominal, were cured. In 9 cases, or 39 per cent., the value of the operation was indicated by amelioration of symptoms and prolongation of life. Death was believed to have been hastened in the remaining 9 cases.

Hunner, in his article, is, on the whole, conservative in his statements. He believes, however, that clinical and post-mortem evidence points to the efficacy of the method. The great drawback to the method, he points out, is the difficulty in making an accurate diagnosis of the form and situation of the aneurism. He holds that the results obtained, considering that nearly all the cases were regarded as hopeless and that the method is still crude and in its infancy, are most impressive.

SURGERY.

UNDER THE CHARGE OF

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Gastro-enterostomy by the Elastic Ligature.—McGRAW (*New York Medical Journal*, January 26, 1901) states that this method of making intestinal anastomosis is unequalled in the rapidity of its execution, its efficiency, and its safety, although it does not accomplish its purpose until after the lapse of two or three days. The disadvantages connected with the use of the Murphy button are that the button may fail to hold the viscera together and the intestinal contents will thus escape into the peritoneal cavity and cause death. Its lumen may become occluded by food or by feces, and, finally, it is by no means always easy to insert and fasten in place, especially when the efferent gut has become small and contracted. The elastic ligature is not suitable for the production of anastomosis between the gall-bladder and the intestine, as the gall-bladder permits the ligature to cut its way through before the viscera have become sufficiently glued together. The best ligature to use is a rubber cord, two millimetres in diameter. This can be threaded on a small needle, and by stretching the rubber during its passage and rendering it thin and small it may be easily drawn after the needle, and its subsequent contraction will then largely increase its size and cause it to more than fill the orifice. The author has operated on five cases by this method. Two died in collapse a few hours after the operation ; two of the three others lived, one fifteen and the other fourteen days after the operation, the one dying from starvation due to the anastomosis having been located too near the ileocæcal valve and the other from the formation of the "vicious circle." The ligature must include in one loop all of the tissues it is desirable to sever, and before inserting the ligature the viscera should be joined together by a row of Lembert sutures. The author desires to urge upon surgeons the trial of this method, and he states that he believes that when one has learned to use it, it will never be abandoned for any other procedure.

The Best Means of Securing Deep and Regular Breathing at the Beginning of Anæsthesia.—HOFMANN (*Centralblatt für Chir.*, January 19, 1901) states that the best method of administering chloroform is by the "drop method"—that is, allowing a steady flow of the chloroform, drop by drop, upon the inhaler until anæsthesia results. It is always most necessary in administering any anæsthetic to allow air in excess while the anæsthetic is being administered. The patient in the natural excitement, which the prospect of the operation has produced, breathes but superficially and struggles against the narcotic, and the anæsthetic which has been poured upon the inhaler evaporates. The result is, that at the end of the operation the patient has apparently had a much greater quantity of the anæsthetic than has really come into contact with his blood or lungs, and has caused the resulting anæsthesia. The best method of securing quiet breathing at the beginning of anæsthesia is to get the patient to count backward from a number having three figures—say 200. In this way, because the larger numbers are more difficult to say and take more time, the patient breathes deeply between each number. Beside this the counting backward requires such a concentration of the mind that the patient's thoughts are diverted from the operation, and a quiet frame of mind is the result, which causes the patient to take the narcotic in full, deep breaths. It has been said that in the case of very nervous patients or those who are unduly excited it would not be possible to get them to count at all, but the author has never had a single case in which after gentle persuasion the patient was unwilling to count. It is always well to have the patient begin to count for at least a minute before any of the anæsthetic is dropped upon the cone, for then the transition from breathing pure air to the mixture of air and narcotic will often pass unobserved. The best assistant one may fairly say is just good enough to take charge of the administration of the anæsthetic.

The Etiology of Dissection and Operation Wounds.—BACON (*Yale Medical Journal*, December, 1900) states that the foremost place as an infecting agent is to be assigned to the streptococcus pyogenes; the staphylococcus pyogenes aureus is probably the next most frequently found; although sometimes met with in pure culture it is still more frequently found in association with the preceding. All of the well recognized "pyogenic" germs may under favorable circumstances give rise to a more or less virulent process. Outside of the germs more frequently included under the head of "pyogenic" may be mentioned the anthrax bacillus, the bacillus of malignant œdema, the tubercle bacillus, the bacillus coli communis, the diplococcus pneumoniæ, the gonococcus, the bacillus of Eberth, and the virus of syphilis. Clinical experience has clearly demonstrated that the passage of a germ through a susceptible body greatly increases the virulence of the germ, so for this reason the dissection or operation wound is apt to lead to a much more severe infection than an ordinary infection not acquired directly from a human being. That germs on being placed in a medium or locality unfavorable to their growth decrease rapidly in virulence is a well-known fact. It is probable that the full degree of virulence that attends direct inoculation at the time of operation, or at the moment of a post-mortem examination, would not be manifest in an infection conveyed by the same germs at a later period, after the lapse of an interval—during which the germs, even if surviving, were exposed to influences, such as desiccation or chilling, comparatively unfavorable to their existence, or at least to the maintenance of one of their most unstable characteristics—their virulence.

Progressive Ankylosis of the Vertebral Column ("Spondylose Rhizomelique").—THÉBAULT (*Rev. d'Orthopédie*, January 1, 1901) states that this disease, which is undoubtedly of an ancient origin, was first described by Marie in February, 1898. The disease is not rare, and is more common in the country (where people are exposed to all the inclemencies of the weather) than in cities. This is primarily a general disease, as Leri has observed. In some cases the vertebræ and the large articulations are most affected, while in others it is confined to the extremities. The onset is always most insidious, and is characterized by vague pains in the lumbosacral region and in the hips. These pains may be either paroxysmal or continuous, or, on the other hand, they may be completely absent. The stiffness usually commences in the lumbar region and hips, and little by little extends to the cervical region, which may, however, in some cases be unaffected. When the ankylosis is marked the attitude of the patient is characteristic. He sinks upon himself and contracts himself in some manner. The normal lumbar lordosis progressively disappears, while the cervicodorsal kyphosis is accentuated and exaggerated in a striking manner. The patient is obliged to look constantly in the direction of his umbilicus. The trunk is flattened in an antero-posterior direction, and the abdomen is divided in two by a deep transverse fold. In the course of the ankylosis the respiration becomes frankly abdominal. Often the ankylosis is so complete that the patient cannot touch the bed with his head while in the dorsal position. Pain is sometimes very severe, but it disappears rapidly on lying down. Muscular atrophy is but slightly pronounced at the onset, but it grows progressively worse. Sensibility remains intact, and the reflexes normal. Trouble in locomotion varies with the degree of ankylosis of the two hips. As a rule, locomotion is irregular and very difficult. The patient is often obliged to place his hands upon his knees in order to re-establish his equilibrium and give support to the atrophied muscles of his thigh. In order for him to pick up an object from the floor, it is necessary for him to bend his knees and so get down without flexing the vertebræ and the hips. The evolution of this disease is essentially chronic and paroxysmal. Leri, Gasne, and others have noted prolonged remissions of pain. The diagnosis is never difficult, as the disease is characterized by its commencement in the vertebral column or in the larger articulations. Pott's disease presents an ankylosis which is angular and always localized, while rheumatoid arthritis is characterized by its being confined to the smaller articulations. The pathological anatomy does not differ from that of rheumatoid arthritis in general. The articulations of the vertebra, the costo-transverse articulations, knees, shoulders, hips, and even sometimes some of the smaller articulations, are all involved in the ossifying process until there is complete disappearance of the articular cavity. The etiological factors may be divided into two groups: (1) Traumatism and (2) infection. Acute articular rheumatism and gonorrhœa are without doubt the most prominent diseases of the second class, and among the others are typhoid fever, pneumonia, and grippe. There is no doubt that medical treatment with the iodides, arsenic, colchicum, and salicylates is absolutely without effect. At the onset, massage aided by electricity and forcible fixation give the best results. In the stationary period immobilization and extension are indicated. Later, suspension, passive gymnastics, and mechanical therapy, after the method of Zander, have been followed with encouraging success by Hoffa, Schanz, Baumler, and Leri. It is along these lines and in this direction that we should direct all our efforts and thereby win much commendation in giving back to these otherwise helpless invalids the use of their legs.

The Bradshaw Lecture on the Association of Inguinal Hernia with the Descent of the Testis—LANGTON (*Lancet*, London, December 29, 1900) states that this affection is so common that it affects probably not less than 5 per cent. of the entire population at all ages of life. The descent of the testis is a developmental process which exerts a dominant influence as a cause of hernia in infants—an influence, however, less powerful as age advances. The journey of the testicle from its original site of development below the kidney to its ultimate destination in the scrotum materially weakens the lower abdominal walls and thus contributes to no small extent to the extrusion of some of the abdominal viscera, especially if associated with a congenitally elongated mesentery. This want of parietal integrity is chiefly manifested in the early periods of life, but the weakness left by the passage of the testis exists to a greater or less degree throughout life, and thus acts as a predisposing factor of hernia at all ages. The more frequent failure at birth of the right vaginal process explains the large preponderance of congenital hernia on the right side as compared with the left. A hernia descending through the unobliterated portion into the cavity or the tunica vaginalis testis is called a congenital hernia, or, preferably, a hernia into the cavity of the tunica vaginalis testis. The term congenital hernia lacks definiteness, as it may be interpreted in two senses: either that the hernia dates from birth, which is not true, or that it is dependent upon an arrest of development of congenital origin, which is true. This nomenclature should be strictly confined to the anatomical position of the hernia and not to its assumed chronological appearance. In acquired inguinal hernia the protrusion with its sac lies in front of the cord and the testis, the sac being loosely connected with the cord, from which it can be easily detached. In congenital hernia, on the other hand, the constituents of the cord are firmly attached to the sac, so that it needs careful dissection to remove the thin membrane, which forms the congenital sac, and so adds much difficulty in the operation for the radical cure of this variety of hernia. The second variety is the funicular hernia, in which a protrusion takes place into the vaginal peritoneal process, closed only at its lower part and consequently separated from the testicular sac, the upper part being still patent. The third variety of congenital hernia, known as infantile hernia, is seen in an arrested development of the closure of the processus vaginalis, except at the extreme upper part, so that the tunica vaginalis testis extends up to the inner ring where it is closed, in which case a hernia may be protruded behind the process and then descend behind the tunica vaginalis testis to the scrotum. Sometimes the abdominal termination of the processus vaginalis may be patent, so that it is not essential for this communication to be closed to constitute it an infantile hernia. Another variety of infantile hernia is observed from time to time where the hernia, instead of continuing its descent behind the cord and testis, pushes itself forward into the unclosed vaginal process, which, on being opened, reveals the convex tumor bulging the posterior wall forward and occupying more or less of the vaginal sac. This is without doubt one of the forms of the so-called encysted hernia of Hey and others. There is another form which may be included in infantile hernia, but which presents such differences that it might be classified as a distinct variety of congenital hernia. It consists of an oval fibrous sac, which is pushed vertically downward into an unobliterated vaginal process and attached by its neck to the inner ring. The sac hangs free in the vaginal cavity and differs from the firm, fleshy, and globular sac of the variety just described. Experience shows that hernia in male infants under six months is much more frequent than in females of the same age. Inguinal hernia occurs eleven times more often in boys than in girls under the age of twelve months, the exact figures being 3215 infant boys to 290 infant girls. These numbers refer to the date of the first application of the patients for relief and not to the date of the first discovery of the lesion. The importance of differentiating these is at once apparent, as the first relates only to the age of examination by the surgeon when the patient is under the age of one year, and therefore cannot fail to be correct, whereas the second includes not only these, but also all patients who come for relief at later ages, and date the first occurrence of their hernia to birth, but whose statements cannot be accepted as absolutely reliable. The proportion, as already stated, is under the first class as fifteen males to one female, while in the second class of patients, who date their hernia from birth, it is as sixteen to one. Inguinal hernia in infant boys is three times more frequent on the right side than on the left, whereas in infant girls the two sides are nearly equal. This disproportion between the two sides in boys is explained by the fact that the processus vaginalis is much more commonly patent in boys at birth on the right side than on the left. The consistent preponderance of ruptured boys as against ruptured girls may be accounted for, firstly, in the structural weakness in the abdominal walls caused by the passage of the testis through them during intra-uterine life, whereby the walls are unable effectually to resist the constant pressure from within; and, secondly, to the failure in the perfect occlusion at birth of the processus vaginalis.

During the first year of life hernia in boys reaches the high percentage of 15.22 of the total number, whereas in the case of girls it is only 8.55 per cent. There must, therefore, be some other dominant cause of hernia in boys beyond the general tendency to hernia in both sexes, and this factor is the descent of the testis. Children born prematurely are very liable to hernia at birth; the hernia is more frequently on both sides than when infants are born at full term, the cause being that under these circumstances the vaginal processes are patent on both sides. Herniæ are largely associated with testes which fail to descend to their normal position in the scrotum. Under such conditions they may be completely retained within the abdomen, for they may be arrested in their descent within the inguinal canals or in the inguino-scrotal region; they may be misplaced in regions outside their normal course, and may be found in the thigh, perineum, and peno-pubal regions. Ectopic testes may be associated with hernia, but this is of rare occurrence. Examination of the records of 7661 males who were the subject of hernia show that of this number 4310 were situated on the right side, 2812 on the left side, and 539 on both sides. Statistics record that in 174 cases the testes were misplaced. In cases of so-called hermaphrodism, who are, however, mostly males, one occasionally meets with cases of inguinal hernia on one or both sides, associated with irreducible bodies in the situation of the external ring. It must not be assumed that all misplaced testes are associated with hernia, though this is usually so. Herniæ may have their origin at birth and they may occur at any age of life for the first time. Congenital hernia may be classified into the following varieties: 1. Hernia into the cavity of the tunica vaginalis testis, which strictly includes the majority of so-called interstitial hernia. 2. Hernia into the funicular process, which descends into the enclosed funicular process of the vaginal peritoneum. 3. Hernia into a post-tunica vaginal sac, commonly known as infantile hernia, in which the protrusion is situated behind a dilated tunica vaginalis, extending as high as the internal abdominal ring. In this class are included also the encysted herniæ, which push before them an invaginated membranous septum into the cavity of an unclosed tunica vaginalis testes. These herniæ are also associated with some anomaly in the closure of the vaginal process. Hernia into the cavity of the tunica vaginalis testes is one of the most common varieties of congenital hernia, and may occur for the first time at any period of life from birth to extreme old age. The percentage rapidly increases from birth till the lustrum of sixteen to twenty years, after which it rapidly declines, so that at sixty years of age the percentage is as low as 0.75 of the total number. Hernia into the cavity of the tunica vaginalis testis is nearly equal on the two sides throughout life, the proportion being 49.58 per cent. on the right side and 48.60 per cent. on the left side. Out of the total number of 8342 cases of right inguinal hernia, 227 were examples of the first form of congenital hernia, and of 5263 patients the subjects of left inguinal hernia, 125 were instances of congenital hernia, or in the proportion of 9 cases on the right side to 8 on the left. The importance of the recognition of this variety of hernia is not inconsiderable, as the probability of the obliteration of the vaginal process is not hopeful, and especially so in the unclosed canal of Nuck. Often the hernia appears to be cured, especially when the patient is under puberty, but the cure is only apparent, and due to the narrowing of the serous canal to such an extent as to prevent the descent of any hernia, but not to real obliteration. Other factors of hernia exist above a patent canal and an unduly large abdominal ring. One patent factor is the elongated mesentery. The herniæ under these circumstances are large, inasmuch as the sac is of congenital origin and capable of receiving a considerable amount of intestine. Herniæ in this variety of congenital patency easily become strangulated and often consist solely of intestine. The prognosis is serious, as the constriction is severe at the inner ring and often there is no omentum to act as a buffer at the seat of strangulation. In early infant life, before any curative operation is admissible, the only course to adopt for the treatment consists in the application of some retentive support, and in the large majority of cases the prognosis is good. The presence of fluid in the sac, passing to and fro from the peritoneal cavity, renders the outlook much less satisfactory than if the protrusion is only intestine or omentum. Such a condition is an indication for operation, and the results of such operations are eminently satisfactory. In this and in the funicular form of congenital hernia the constituents of the cord are more intimately adherent to the sac than in ordinary acquired hernia, and the danger to the vas deferens is thus correspondingly increased, the walls of the sac being very thin. In exstrophy of the bladder it is very common to find both testes retained in the inguinal canal with hernia into their unclosed sacs. Herniæ into the funicular process are often met with, but their diagnosis presents greater difficulties than do those of the preceding variety. A characteristic case presents an elongated sausage-shaped tumor of uniform calibre throughout in a line with the axis of the cord passing down to the upper border of the testis, from which it is separated by a longer or shorter constriction. The proportion of herniæ into the cavity of the tunica vaginalis testis and into the funicular process is represented by one in every twenty-nine cases, or 3½ per cent. of all cases of inguinal hernia. Funicular herniæ are not so liable to strangulation and are reduced with greater ease than are those into the cavity of the tunica vaginalis, but they are retained by instrumental support with greater uncertainty. The third variety of congenital hernia is infantile hernia and consists of the forms which have already been described. There is still another variety of congenital hernia which may be appropriately called "interstitial," being primarily situated within the abdominal muscular walls, within which is placed an undeveloped testis. An examination of 50,000 cases shows that this hernia occurs in the proportion of one case to 1100 cases. This variety of hernia may be classified according to the direction which the protrusion takes after its passage through the inner ring. Interstitial hernia is comparatively frequent in women, 18 cases occurring out of 13,583 female patients, so that the proportion is one in 760 patients, or nearly twice as frequent as in males. These herniæ in women are often of very great size, and among the causes is probably distention of the abdominal muscles during pregnancy, for most of them were mothers of large families. The treatment of interstitial hernia is neither scientific nor satisfactory, for the pressure of the truss is mainly directed to covering the hernia, and in most instances it is unable to effect complete retention. Operative measures for the reduction and cure of the hernia are often attended with difficulty, as the separation of such an extent of the abdominal muscles renders the complete approximation of the parietes almost impracticable. The size of the hernia is so great that the abdominal cavity is unable to receive such a large accession of viscera, so that the question of an enterectomy must be considered to allow of the complete reduction of the extruded mass.

Some Remarks on the Modern Surgical and Medical Treatment of Epilepsy.—Clark (*Medical Record*, January 12, 1901) thus summarizes the present status of trephining: 1. Idiopathic epileptics with typical grand mal seizures should never be trephined. 2. Idiopathics, in whom seizures are of the Jacksonian type, should be trephined only when infantile cerebral palsies can be excluded, and when the family and personal degeneracy is at a minimum. If operation is determined upon in such cases a very thorough removal of the epileptogenic area should be made. Even then but a fraction of 1 per cent. recover from their epilepsy. 3. Traumatic epileptics may be trephined when the injury is definitely proven and stands in direct causal relation and has existed not more than two years. The prognosis will then largely rest upon the degree of the neurotic predisposition present. The earlier trephining is resorted to, after convulsions begin, the better the prognosis. If these rules are followed many less so-called traumatic causes will be trephined, but the result will far exceed 4 per cent. of recoveries. All epileptics trephined for whatever cause must be given post-operative bromide treatment for years.

PEDIATRICS.

UNDER THE CHARGE OF

LOUIS STARR, M.D.,
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AND

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The Addition of Sugar of Milk to Cow's Milk.—J. PRECHTL (*Jahrbüch f. Kinderheilkunde*, 1901, Band iii., S. 216) has had occasion to observe several infants fed upon home-sterilized milk whose general condition left something to be desired. These children, without bad hereditary antecedents, were large, but at the same time pale and anæmic, with flabby muscles and slender bones. Their stools were not constipated, contained mucus at times, but were in general normal in appearance. The only noticeable fact of importance was that there were frequent acid eructations with gas, the emission of which gave manifest relief.

The only peculiarity in their feeding consisted in the addition of sugar of milk to increase the sugar percentage to something nearer that of human milk.

The author discontinued the addition of milk sugar and at once the acid eructations and flatulence ceased and the development of these children became normal.

The rôle of sugar of milk in dyspeptic troubles is explained in the following way: Casein, which in cow's milk differs from that in human milk, is combined in both with phosphate of calcium. According to the researches of Rumpf lactic acid possesses the property of precipitating the salts of calcium, and thus the casein is set free and coagulated. Sugar of milk, which easily undergoes lactic fermentation, has the effect of coagulating the casein of cow's milk and rendering its digestion difficult, thus creating conditions favorable for the development of dyspepsia.

The Frequency and Exciting Causes of Infantile Palsy.—ZAPPERT (*Jahrbüch f. Kinderheilkunde*, 1901, Band iii., S. 125) bases this study upon 208 cases of poliomyelitis observed over a space of twelve years in the polyclinic of Vienna. The theory of the infectious origin of poliomyelitis, first pointed out by Strümpell and Marie, is now generally admitted, and one of the strong arguments in favor of this view is the seriatim or epidemic appearance of the disease. This fact is well shown in the records made by Zappert in the prosecution of this study. These showed that from 1886 to 1897 the number of cases ranged between three and eighteen; in 1898 this average rose to forty-two, to fall to six in 1899. Moreover, of the 129 cases observed between 1886 and 1897 there were thirty-five which began between the months of January and July, and from July to January there were seventy-five, while in nineteen cases the date of onset was not ascertainable. Even if all the uncertain cases were to be ascribed to the earlier half of the year the number occurring from July to January would still be notably the larger. The preponderance of cases in the summer months thus seems quite evident. In the epidemic of 1898 four cases developed from January to July; in July, five cases; in August, eleven cases; in September, twelve cases; in October, four cases; in November, three cases, and in December, one case. Among these cases and also among those of preceding years there was not one instance of family infection, nor were the cases confined to one street, or house, or to a certain section of the city. It therefore seems certain that if infantile palsy is an infectious disease its power of contagion is very limited, in which respect it resembles cerebro-spinal meningitis.

In the great majority of cases the symptoms of onset were little marked. As so frequently happens, the paralysis was often the first symptom to attract the attention of the parents, whether an upper or lower member were affected. Quite often the upper and lower limbs were affected at the same time—a fact which is not in accord with the usual classic description of the disease.

It is well known that Strümpell, and later Medin, held that poliomyelitis and polioencephalitis are affections so intimately related that they may be combined in the same patient. In Zappert's cases this coincidence has not been noted, though the statistics of the polyclinic for 1898 show that such nervous affections as idiocy, atrophy of the optic nerve, convulsions, etc., were nearly doubled in that year over the average of previous years. No relation could be deduced between the increase in infantile palsy in 1898 and the extension of cerebro-spinal meningitis during the same year. The importance of the exciting causes to which infantile palsies have been attributed is carefully investigated. In five cases the palsy was said to be of congenital origin, but of the five only one presented satisfactory evidence of authenticity. This could be explained by the existence of a hemorrhage at the level of the anterior horns produced during birth; or one might admit the existence of a progressive muscular atrophy of the Werdnig-Hoffmann type. The question could not be decided except by the subsequent progress of the case. For the present Zappert leaves in doubt the existence of a congenital anterior poliomyelitis.

Traumatism was the imputed cause in five cases, but in two only was it admissible. Such cases are probably due to ascending neuritis with secondary lesion of the cord, or to lesion of the anterior horns by concussion provoked by the traumatism.

The influence of cold, violent impressions, muscular fatigue and heredity has never been satisfactorily established. The infectious diseases, however, play a very important rôle. Of the thirty cases in which the previous occurrence of an infectious disease was mentioned, in five infantile palsy followed after a brief interval or even directly. Of these measles was mentioned twice, scarlatina once, and diphtheria twice. Under these conditions the infectious disease must act in one of two ways: either it increases the virulence of the specific agent which we have not as yet isolated, or the clinical picture of infantile palsy as well as its lesions can be produced by various morbid agents or their toxins. It is possible that the infectious disease may act by producing an ascending neuritis which produces a lesion of the cord of which the palsy is the clinical expression.

A Study of the Plantar Reflex in Infancy.—JOHN LOVETT MORSE (*Pediatrics*, 1901, vol. xi., No. 1) has presented a study undertaken to determine, if possible, whether or not the plantar reflex is present in infancy; if present, its character; and if absent in early infancy, at what age it is developed; and, incidentally, it was hoped that something might be learned as to the value of the Babinski phenomenon in the diagnosis of nervous diseases in infancy. Two hundred and fifty-four infants under two years of age, not suffering from any form of nervous disease, were examined as they presented themselves consecutively at the out-patient department of the Infants' Hospital, Boston.

The conclusions of the few observers that have studied the plantar reflex in infancy are somewhat at variance. Babinski found that in the new-born irritation of the sole of the foot normally caused extension of the toes. He attributed this to the imperfect development of the pyramidal tracts at birth, and considered it as a proof of the dependence of the toe phenomenon upon disturbance of the function of the pyramidal tract.

In the author's experiments a moderately sharply pointed orange stick was used, drawn, not too rapidly or too forcibly, from the heel toward the toes along the outer side and middle of the foot. Each foot was always tested several times in order to avoid error. The flexion of all or some of the toes was accepted as the flexor reflex; the extensor reflex was limited to the deliberate marked extension of the great toe, with or without extension or separation of the other toes. He draws attention to the point that dorsal flexion of the foot, including the toes, should not be mistaken for the extensor reflex, and thinks it probable that this has been mistaken by some observers for the true extensor reflex, which may explain the discrepancy in the results from various studies. Great difficulty was experienced in many cases in determining the presence or absence of a reflex because of the tendency of infants to hold their feet rigidly, and because of their almost constant purposeless movements.

The result of this study showed that in 35 per cent. of the cases there was no plantar reflex; in 7 per cent., no reflex on one side and flexion on the other; in 6 per cent., no reflex on one side and extension on the other; in 5 per cent., flexion on one side and extension on the other; in 25½ per cent., flexion on both sides; in 21½ per cent., extension on both sides. Further analysis showed that the reflex was absent on both sides much more often in the first than in the second year, and much more frequently in the first nine than in the last three months of the first year. It also shows that extension on both sides was much more frequent than flexion on both sides during the first nine months, while the condition was reversed after this age. Extension on one side with flexion on the other, and extension or flexion on one side with no reflex on the other occurred with about equal frequency at all ages. Dorsal flexion of the feet and marked drawing up of the legs were not uncommon reactions in the first year, but occurred very rarely in the second year. To state this definitely it may be said that in the first year extension on both sides was much more frequent than flexion on both sides, but there was no reflex in as many cases as in the two other classes combined (41 per cent.). In the second year, while there was no reflex in 15 per cent. of the cases there was flexion on both sides in 57½ per cent. and extension on both sides in only 9 per cent.

It is evident from this study that there is no constant plantar reflex in the first year, and that while the reflex approaches the adult reflex during the second year, it is still inconstant. It is also evident that since there is no constant reflex under normal conditions during the first two years, no conclusions can be drawn from the presence, absence, or character of the reflex in diagnosis of abnormal conditions of the nervous system at this age.

A Case of Lobar Pneumonia due to the Bacillus of Eberth.—TOLLEMER (*Société de Pédiatrie*, January 8, 1901; *Revue mensuelle des Maladies de l'Enfance*, February, 1901, p. 98) reports the case of a child convalescing from typhoid fever. When the temperature had been normal for several days, cough, dyspnœa, and pain in the side developed. On the fourth day the temperature reached 103°, and the classical signs of lobar pneumonia were easily recognized. Examination of the expectoration showed the presence of streptococci of low virulence and numerous typhoid bacilli. Pneumococci were not present. Examination of mucus from the pharynx made several days after recovery showed absence of typhoid bacilli.

Mixed Feeding of Infants.—JOHN ZAHORSKY (*Pediatrics*, March 15, 1901, p. 208) considers this subject under two headings: 1. Artificial feeding as an adjuvant to nursing. 2. Human milk as an adjuvant to artificial foods. Under the first head he considers first the usually stated conditions demanding the addition of artificial food—deficiency in the quantity of the mother's milk and deficiency in solid constituents. When the mother's milk contains an excess of proteids causing colic and indigestion he recommends the use of some food containing dextrinized gruel, condensed milk, or some food which contains dextrin, sugar, and starch, to be given immediately before nursing. The artificial food dilutes the breast milk, and the carbohydrates inhibit the decomposition of the proteids. When the human milk causes diarrhœa, whether there is some gastro-enteric infection or the milk possesses decided laxative qualities, a solution of dextrinized gruel administered before nursing acts very well. When constipation is a marked feature under breast feeding, in some cases a deficiency in fat exists, while in others, in which the milk is perfectly normal, the condition must be ascribed to excessive absorption of fat or to a congenital weakness of the muscular coat of the colon. Whatever the cause, in a great majority of cases additional feeding acts very happily. A milk mixture containing about 4 per cent. of fat, 1 per cent. of proteids, and 7 per cent. of sugar, given two or three times daily, is usually all that is necessary. Egg albumin has been found to be very laxative for young infants, and an egg-water made with the white of one egg to ten ounces of water and sweetened with cane-sugar may be given two or three times daily in doses of a few ounces. Older infants (eight to twelve months) seem to digest this mixture perfectly, and the laxative effect is not so marked. Oatmeal gruel or one of the malted mixtures may be used in the older cases. In obstinate cases the administration of pure butter deserves trial.

Under the second heading of his paper the author insists upon the value of even a few ounces of human milk in the dietetic management of acute or chronic digestive diseases. For this purpose the milk of a woman who is advanced some months in the period of lactation is to be preferred, since her milk is less liable to prove too rich in solid constituents. The properties of this milk are both nutritive and therapeutic; it is a powerful stimulant to the digestive and absorptive functions of the gastro-enteric tract; it seems also to give strength and tonicity to the vascular system; it supplies antitoxic and bactericidal properties to the blood of the infant which struggles with some infectious process. In marantic conditions the addition of mother's milk, even in small quantities, to the food very quickly changes the clinical picture to one of improvement; or the baby may be given mother's milk exclusively for a few days, and artificial food gradually supplied; or mother's milk and artificial food may be given alternately. Mixture of the human milk with the artificial food in the bottle is preferred by the author. In the convalescence from acute gastroenteric infections the addition of a little human milk to the rice or barley water first employed will be of distinct advantage until sterilized cow's milk may be gradually substituted for it.

In rickets with marked nervous symptoms and in scurvy the temporary use of breast milk in as large a quantity as can be obtained offers very decided advantages over any form of purely artificial feeding.

Suppurative Cerebro-spinal Meningitis due to the Influenza Bacillus.— J. LANGER (*Jahrbüch f. Kinderheilkunde*, 1901, Band iii., S. 91) records the case of a boy, aged nine years, who was admitted to the service of Ganghofner (Prague) on the eighth day of an affection which had all the characteristics of a meningitis. The illness had begun with violent headache and prostration, with tendency to somnolence, and later vomiting and rigidity of the neck. Fifteen days before the appearance of these symptoms the father, mother, and brothers of the child had developed influenza.

Upon admission to hospital, beside the symptoms already noted, there were observed sluggishness of the pupils, the gun-hammer position, fibrillary contractions of the muscles, hyperæsthesia of the skin, abolition of knee-jerks, and a temperature of 99.8° F. A diagnosis of probable tuberculous meningitis was made. On the third day the temperature rose rapidly to 103.8°. Lumbar puncture yielded a purulent liquid which showed, beside fibrin, a large number of polynuclear leucocytes. These enclosed bacilli, which proved to be, after culture, the bacilli of influenza. A culture of nasal secretion made the same day gave only staphylococci and other micrococci. The day after the puncture the temperature fell, and the case went on to recovery. This case is thought to be the second in which the presence of Pfeiffer's bacillus has been clearly proven during life in the cerebro-spinal fluid in a case of meningitis. The first case of the kind was reported by Slawyk.

THERAPEUTICS.

UNDER THE CHARGE OF

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Inappetence.—DR. IZSO HÖNIG states that it is in patients with a normal temperature and suffering from chronic diseases that this symptom requires attention. He presents two classes: (1) Those suffering from conditions causative of diminished or absent appetite—*e. g.*, anæmia, chlorosis, helminthiasis, enteroptosis, etc. Here the symptom and the cause must be treated. (2) Chronic diseases for which there is at present no direct treatment—*e. g.*, carcinoma and tuberculosis. Noting the use of bitters, the author proceeds to cite the unpleasant effects of orexin hydrochloride in producing so much burning and pain in the stomach that it often failed to excite the appetite. These effects are not so often seen after orexin tarmates and basic orexin, yet frequently these are not more certain to produce appetite than the bitters, and sometimes they fail altogether. Vanadin, in doses of from five to twenty drops thrice daily, especially in tuberculous patients, often gives good results. The theory is that this remedy, which is really a hyperoxygenated vanadium salt, parts with its excess of oxygen, and not only stimulates the stomach, but hinders fermentation. Later sodium metavadinate, in dose from one to five sixty-fourths of a grain, given before meals, has been recommended by several authorities. It should be administered with intervals of rest, and, as the remedy is practically tasteless, it is pleasant to take, and seems to be effective in improving the appetite, increasing the strength, and adding to the body-weight. Brilliant results have followed the use of electricity and massage of the stomach, but they quite as frequently fail. Of late krymotherapy—which consists of local application of intense cold—has attracted attention. Liquefied carbon dioxide is the means employed, liberated from its container into a linen bag the size of the stomach, and applied externally. Unpleasant symptoms, as pain and severe cold, have not been observed. After four or five days the appetite appears, and continues long after the cessation of treatment. This method seems the more certain of those mentioned in this paper.—*Klinische-therapeutische Wochenschrift*, 1901, No. 21, S. 686.

Acute Articular Rheumatism in Children.—DR. FRANK C. SIMPSON believes that although the salicylic compounds are still the principal remedies in the treatment of this disease they must be used sparingly in children, because they produce so much depression. In some instances sixty to one hundred grains of salicylates may be taken before the stomach rebels. Oil of wintergreen is effective in some instances, but is objectionable because it upsets the stomach. The alkaline treatment following the use of the salicylates consists in controlling pain and fever and never affects the stomach. Rest in bed is the only safeguard against endocarditis. If this has become established, the patient must be kept in the recumbent position and small doses of opium administered.—*Pediatrics*, vol. xi. p. 247.

An Investigation of Colchicum.—MR. LOUIS SCHULZE has made comparative usage of the root and seed. He finds for the seed an average of between 0.6 and 0.7 per cent.; for the root, between 0.4 and 0.5 per cent. colchicine. It would appear that the seeds are slightly richer in the alkaloid, and there appears to be no valid reason for the retention of the root in the pharmacopœia.—*American Journal of Pharmacy*, 1901, vol. lxxiii. p. 293.

Codeine.—DR. G. BARDEL finds from his physiological and clinical studies that codeine is not hypnotic. It depresses, but does not cause sleep. Attention is directed to the muscular enfeeblement, visual difficulties, slight vertigo, dry mouth, nausea, rarely vomiting, marked occipital headache, slow pulse, and sometimes slight contraction of the pupil, which doses of from three to six grains produce, but even with these amounts there is no tendency to sleep.—*Les Nouveaux Remèdes*, 1901, No. 10, p. 217.

Phosphorus Medication.—DR. A. MARTINET has reviewed the extensive literature, quoting much of recent date. He concludes: (1) Substances containing phosphorus (glycero-phosphates, lecithins, phosphoric acid) fix phosphorus in the organism. (2) They stimulate the multiplication of cellular elements—*i. e.*, the enlargement and division of nuclei and changes in multiplication. (3) They produce a general dynamogenic action. (4) Beside these properties phosphoric acid is anti-alkaline, antiseptic, and assists digestion.—*La Presse Médicale*, 1901, No. 44, p. 258.

Citrophen.—DR. L. FREYBERGER states that this substance, which is chemically paraphenetidin citrate, is of considerable value as an antipyretic in fifteen-grain doses. As an antirheumatic it is decidedly inferior to sodium salicylate and salol. As an antineuralgic, its action is quick and persistent in headache, migraine, occipital and frontal neuralgia, menstrual headache, but it failed in one instance of inveterate trigeminal neuralgia. Three or four doses per day of the above-mentioned amount are sufficient.—*Treatment*, vol. v. p. 5.

Trional Poisoning.—DR. M. ROSENFELD remarks that in the two instances where this drug (two and four drachms) was taken without suicidal intent (Collatz and Kramer) collapse only was observed; there was no hæmatoporphyrinuria. In the cases of Boyer and Hertwig, when large doses of both this and sulphonal were given, no hæmatoporphyrinuria resulted. To the fatal cases reported by Schultze, Geill, and Ruedy, the author adds one (a lunatic) when the dose was fifteen grains daily, but this was not taken regularly. After some months one death occurred. The diagnosis was based on the vertigo, disturbed gait, absent reflexes, respiration of the Kussmaul type, hæmatoporphyrinuria, and the fact that the necropsy showed no cause for the fatal result other than the one assigned.—*Berliner klinische Wochenschrift*, 1900, No. 20, S. 547.

Erythral Tetranitrate in Lead Colic.—DOTT. MATTIRLO records the observation that in lead-poisoning arterial tension is high. In the present instance the pulse was hard and the sphygmographic tracing was characteristic. The remedy was administered in one-half grain dose. The results were that with the reduction of arterial tension there was a cessation of pain, and the patient slept. Two days later similar treatment during an acute attack was successful.—*Gazetta degli Ospedali e delle Cliniche*, 1901, No. 63, p. 671.

Glonoin.—DR. H. EDWIN LEWIS finds that in all conditions of spasmodic contraction of muscular tissue glonoin is of marked service. In angina pectoris it is equalled by no other drug; for prompt relief the dose should be one-twenty-fifth of a grain followed by one-two-hundred-and-fiftieth of a grain every hour or two. It is useful to relieve the symptoms which accompany arterial sclerosis, delays the progress of senile gangrene and Raynaud's disease, and, used early, occasionally prevents their onset. In sciatica one-fiftieth of a grain combined with morphine will frequently give relief when the latter used alone is unsuccessful. Its continued use is recommended for relieving the high tension and pains of tabes dorsalis. In uræmic convulsions, combined with pilocarpine, it is of marked value. After citing various indications for its use, the author remarks that children seem to have a special tolerance for the drug, and several instances are on record where children have eaten a dozen or more of one-hundredth grain tablets without any poisonous effects whatever. In cholera infantum, with pronounced nervous symptoms, or when the skin becomes cold and clammy, this remedy is a life-saver in frequently repeated doses of one two-hundred-and-fiftieth of a grain.—*Merck's Archives*, 1901, vol. iii. p. 164.

Therapeutic Use of Oxygen.—DR. E ARON, from clinical observation, concludes that in chlorosis the results are absolutely negative. In some instances of cardiac or pulmonary dyspnœa they have been slightly favorable, but often the improvement ceased so soon as the inhalations were suspended; possibly, suggestion was partly responsible. In syncope, as in morphine-poisoning, oxygen is not to be compared with artificial respiration. It is only in poisoning by carbon monoxide that oxygen inhalations are really indicated. Inhalations are also useful in aniline poisoning, and to counteract the disturbances produced by rarefied air. Manometer experiments show that oxygen renders the respiration more frequent and more superficial.—*La Semaine Médicale*, 1901, No. 21, p. 165.

Treatment of Pneumonia.—DR. LEONARD WEBER in asthenic pneumonia gives hypodermically nitroglycerin, one-fiftieth of a grain; strychnine, one-thirtieth to one-twentieth of a grain, and camphor oil, one-half drachm. Alcoholic pneumonias receive ammonium carbonate or the anisated solution of ammonia every two or three hours, or camphor, one or two grains with benzoic acid, three to five grains in capsule, every three hours. For delirium tremens symptoms, strychnine, one-twentieth of a grain, and apomorphine, one-twentieth of a grain, may be given hypodermically three or four times daily. In septic pneumonias alcoholic stimulants in large doses (two ounces of whiskey) every three or four hours are indicated. In case of delayed resolution ten drops of turpentine every two hours in emulsion is highly recommended. A hot mustard bath is deemed to be of value in the pneumonias of children. A pound of mustard is diffused in a baby's bath tub of water at 105° F. The duration of the bath is ten minutes with friction. —*Post-Graduate*, vol. xvi. p. 525.

Therapeutic Management of Typhoid Fever.—DR. AURETE NADEAU finds excellent results from the administration of calomel, because (1) it is a germ destroyer and local antiseptic of the first order. (2) It is a purgative, and by producing copious stools, full of bile, serves as a scavenger of the intestinal tract. (3) Bile is a physiological bowel antiseptic, and the stimulant of its healthy antisepsis. (4) Absorbed in small quantities, calomel increases leucocytosis, the reserve force of nature in time of trouble. (5) It is an unquestioned diuretic. Important as it is in the initial stage calomel may become harmful later on as an irritant at a period when purgatives could prove dangerous to the ulcerated follicles and Peyer's glands. Therefore, even in small doses, it is contraindicated after the first week. Now, betanaphtol in eight-grain and bismuth salicylate in four-grain doses three to twelve times daily may be administered. Since the betanaphtol may irritate the kidneys benzonaphtol can be substituted for it. Some other bismuth preparation may be substituted for the salicylate. Antipyretics with this treatment are usually not indicated; those of the coal-tar series are prescribed. Sodium salicylate is useful in typhoid fever as an antipyretic, but its use should be limited to one or two doses daily.—*Merck's Archives*, 1901, vol. iii. p. 8.

Typhoid Fever in Children.—DR. HENRY DWIGHT CHAPIN reports six instances (five recoveries). The treatment was generally alcohol sponge baths for high temperature, nitroglycerin or strychnine for stimulation, clearing of bowels with calomel, followed by disinfection by chlorine water or hydrochloric acid with a diet of peptonized milk and gruels.—*Post-Graduate*, 1901, vol. xvi. p. 445.

Fermentative Conditions Associated with Chronic Gastritis.—DR. JOHN C. HEMMETER believes that treatment should be directed toward restoring the motor functions. When fermentation is marked nothing can take the place of lavage; the gastric spray is useless. Introgastric electricity is useful to restore the lost muscular tonicity; a strong faradic current in high tension, the positive pole within the stomach and the negative alternately in the epigastrium and over the spine. The best results are obtained by a faradic current equal to that of one groove cell freshly prepared, sending four stimulations into the stomach in one second. The galvanic current is more useful in allaying gastric pains. It is well to exclude carbohydrates from the diet entirely for a time and to nourish the patient exclusively by proteid food in a finely divided state (scraped beef, Hamburg steak, sweetbreads, fish, calves' brains, egg albumin, gelatin). All food should be so served that it requires very little mastication. If there is an absence of free hydrochloric acid after test-meals, this should be supplied in gelatin capsules during and after meals.—*International Medical Magazine*, 1901, vol. x. p. 321.

DR. ALLEN JONES knows of no remedy for gastric fermentation which compares in efficiency with the following: Cerium oxalate, 1; bismuth subcarbonate, 2; calcined magnesia, 4 parts. Of the mixture, one-half to one teaspoonful should be given, stirred in a quarter of a glass of water, at 10 A.M., 3 P.M., and 9 P.M., or thereabouts as to time. Flatulency subsides, gastric discomfort disappears, and the bowels are usually opened, at times too much so, when the dose should be reduced.

DR. CARL VON NOORDEN gives a full tablespoonful of chloroform, 1, in water, 50, immediately after lavage. The lavage should be practised in the evening two hours after the last meal. In the beginning of treatment the stomach should be washed out in the morning for a few days. Two-and-one-half to three grains of thymol are administered in wafers after each meal.—*Ibid.*, pp. 342, 345.

The Use of Ice Per Rectum in Narcotic Poisoning.—DR. WILLIS CUMMINGS notes that ice introduced into the rectum produces very promptly temporary return to consciousness in opium-poisoning. Instances are reported of chloral, coal gas, and strychnine-poisoning in which ice was successfully used. Immediate results have been claimed in alcoholic coma, "supposed diabetic coma," coma from ascites with cardiac insufficiency. When instant stimulation of the vasomotor or sympathetic centres is needed ice per rectum will be found an efficient aid.—*Merck's Archives*, 1901, vol. iii. p. 86.

The Use of the Suprarenal Capsule in Diseases of the Heart.—DR. SAMUEL HOERSCHEIM, from an analysis of the histories of one hundred patients, reaches the following conclusions: After the administration of the suprarenal powder the following was observed: (1) A weak and irregular acting heart became stronger and more regular; (2) a dilated heart was contracted; (3) a diffused apex-beat became localized; (4) a diffused, loud, and rough mitral regurgitant murmur became localized, smoother, and lessened in intensity, while in some cases the murmur disappeared; (5) a murmur which, owing to the extreme weakness of the heart, could scarcely be heard, became more distinct, thus aiding in the diagnosis; (6) the normal cardiac sounds, when distinct, became clearer and more easily distinguished; (7) in some cases a rapid pulse became less rapid; in other cases a slow pulse became faster; (8) patients who were very weak, with organic heart disease, were improved; (9) no effect was observed in organic heart disease when the pulse was strong and regular.—*New York Medical Journal*, 1901, vol. lxxiii. p. 847.

Resorcin as a Preservative for Suprarenal Extract Solution.—DR. SEYMOUR OPPENHEIMER, after experiments with boric acid, camphor, glycerin, mercuric chloride, silver salts and alcohol, recommends a 1 per cent. aqueous solution of resorcin. To each ounce of this solution sixty grains of the desiccated suprarenal extract are added. The quantity necessary for daily use is filtered, and thus a clear solution is obtained.—*Laryngoscope*, vol. x. p. 187.

Treatment of Burns in Infancy and Childhood.—DR. CHARLES WARREN ALLEN, for local application for burns of the first and second degrees, knows nothing better than a 1 per cent. aqueous solution of picric acid. This gives almost immediate relief from pain, and healing takes place rapidly. After the burned area has been coated once or twice with the solution a thin layer of absorbent cotton may be applied dry, and over this a layer of impervious tissue, and, finally, as much cotton as may be required for warmth, protection, exclusion of air and germs, and over this a loose bandage. The pain of erythematous areas may be greatly relieved by local baths containing potassium nitrate or bicarbonate in saturated solution. When there are raised water blisters these may be carefully cut away at the edge, and a layer of cotton soaked in a saturated solution of potassium chlorate to which a little glycerin is added may be applied over the wound. In deep and extensive burns a permanent bath offers one of the best means of securing comfort. Among soothing remedies the old " carron oil " is the best known, and probably most extensively used. It has the advantage of being easy of preparation from ingredients easily obtained. It is well to add some antiseptic and boric acid powder (5 per cent.), thymol (1 to 1000), carbolic acid (1 to 500), or orthoform (1 per cent.) are recommended. An important point is to refrain from removal of the dressings. If this layer of gauze, cotton, or cheese-cloth comes next the wound these need not be taken up, but the application may be applied over and through the dressings.—*Pediatrics*, 1901, vol. xi. p. 224.

OBSTETRICS.

UNDER THE CHARGE OF

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Syncytioma Malignum.—In the Edinburgh *Medical Journal*, May, 1901, MACKENNA contributes an article in which he has collected the statistics of 78 cases. The average age of the patients was thirty-three years, and in most of them a hydatid mole or abortion had preceded the development of the disease. In 38 cases hydatid mole preceded parturition at term in 24, abortion in 15, and premature labor in 1. The disease made its appearance in 6.9 weeks after delivery at term, in 11.4 weeks after abortion, and in 10 weeks after hydatid mole. As regards metastases, in 33 the lungs were affected, the vagina in 17, the spleen in 8, the liver in 6, the kidneys in 6, and the ovaries in 4. The broad ligaments, pelvic connective tissue, bladder, mesentery, femur, and brain were each affected in two cases.

[The reviewer reported in the *American Journal of Obstetrics*, July, 1900, a case of syncytioma malignum with metastases in the brain, liver, kidneys, and lungs, in which the uterus and pelvic organs were unaltered. This case has been overlooked by MacKenna in his paper.]

Cæsarean Section.—CRAGIN (*Medical Record*, May 4, 1901) reports nine Cæsarean sections during the last three years at the Sloane Maternity. One of these cases was the removal of the entire uterus for cancer, and proved fatal. Six of the nine were Sänger Cæsarean cases, and two were hysterectomies. With the exception of the case of cancer the patients did well.

He believes that Cæsarean section is preferable to symphysiotomy, and that the operation should be extended to private houses. In his last operations catgut only was used for suture, the broad ligaments were compressed by the hands of an assistant, and the uterus was stimulated to contract by hot saline solution. The omentum was placed over the uterus before closing the abdomen.

The Lower Uterine Segment.—SMYLY (*British Medical Journal*, May 18, 1901) contributes an interesting paper upon this subject. He finds in existence four theories regarding the lower uterine segment: One, that it develops during pregnancy from the lower part of the body of the uterus; another, that it develops from the upper part of the cervix; a third, that it is formed from the cervix uteri, and a fourth, that it is developed from both the body and the cervix. It seems probable to him that it is developed from the upper portion of the uterus during pregnancy.

He calls attention to its clinical importance during labor, and believes that it prevents the rupture of the membranes by receiving a part of the force of the uterus which otherwise would be expended upon the membranes. During the third stage, when the uterus expels the placenta from the contractile portion, the lower segment becomes distended and can be easily felt above the pubis. In delivering the placenta, it is best to wait until the uterus has separated it from its wall and until it can be appreciated in the lower uterine segment above the pelvic brim. In abnormal labor, if the lower segment be badly developed, the force of pressure is received by the membranes, which rupture prematurely.

When the lower segment is closely applied to the fœtus, as in normal cases, it is impossible for the umbilical cord to prolapse, no matter how contracted the pelvis may be. In deformed pelves the cord will not prolapse so long as the lower uterine segment remains tightly applied to the presenting part. It is not the contour of the pelvis which determines the prolapse of the cord but the presence or absence of the uterine segment.

In placenta prævia he advises the treatment proposed by Robert Barnes. He would rupture the membranes, bring down a foot, and allow the case to proceed naturally. While this method sacrifices the child in many cases it is safest for the mother, and most efficient. In cases where the head has passed through the cervix, it can better be delivered by forceps. Where the os is not sufficiently dilated to admit two fingers, this sort of version cannot be carried out. He has never seen a case of placenta prævia in which two fingers could not be carried through the os and cervix, and the condition must be a very rare one.

In rupture of the uterus the lower uterine segment becomes extraordinarily thinned, and the fœtal part can be felt through the uterine tissue with remarkable plainness.

It occasionally happens that the contraction ring at the junction of the upper and lower segments of the uterus forms an obstacle to labor. The use of narcotics and patient dilatation with the hand are usually sufficient in these cases.

The Dangers and Diagnosis of Breech Presentation.—In the *British Medical Journal*, May, 1901, SPENCER calls attention to the dangers of breech presentation to the fœtus. In twenty-six cases in which he made an autopsy upon the fœtus, hemorrhage had taken place into the kidney to such an extent that had the child lived the kidneys must have been permanently damaged. This suggests the necessity for caution in making pressure upon the region of the kidneys during the delivery of the child. Hæmatoma of the liver and injury to the lungs may also result in these cases. Hemorrhage into the mucous membrane of the uterus may result from pressure in breech presentation, and is sometimes mistaken for menstruation in infants. In children delivered by the Prague method, hemorrhage into the muscles of the neck is often seen. Damage to the brachial plexus and injuries to the bones and joints are sometimes observed.

In diagnosticating breech presentation the bladder and bowels of the patient should be emptied. She should lie upon her back along the edge of a couch or bed with the shoulders and head somewhat raised. Auscultation is especially valuable in these cases, as the heart-sounds are heard higher than in vertex presentation. By palpation the head is not found in the lower uterine segment, but can be detected at the other extremity of the uterus. In one form of monstrosity, anencephalic fœtus, palpation fails to reveal the diagnosis. In this instance the fœtal head is no larger than the breech.

The diagnosis having been made, Spencer urges that external version be performed. It is rare that an anæsthetic is required, and usually the fœtus can be turned with little difficulty. An abdominal belt may be worn to prevent the recurrence of the abnormal presentation. One-fifth of such cases occur in multiple pregnancies, with a mortality of 12.7 per cent.

The operation of external version should not be attempted in a considerably flattened pelvis where the fœtus is dead, the uterus malformed, or placenta prævia is present. The operation may fail if the cord has been wound about the child's neck or if fibroid tumors of the uterus are present. Ordinarily, however, it does not offer especial difficulty.

The Management of Labor Complicated by Chronic Heart Disease.—In the *Birmingham Medical Review*, February, 1901, POSS contributes a paper upon this subject. He finds that aortic lesions are less serious, with a mortality ranging from 11 to 23 per cent., than mitral lesions, whose mortality is given in stenotic cases as from 46 to 64 per cent. The fœtus suffers worse in mitral cases. Death of the mother occurred most frequently during the second stage of labor or in the early puerperium. In aortic cases the patients are worse during pregnancy, and when labor is ended rapidly improve. In mitral cases unfavorable symptoms may develop at any time, attain a maximum during labor, and do not disappear during the puerperal condition. The heart-sounds are often not altered in these cases, and hence the physician may overlook the condition present. Usually these patients have much discomfort in the early months of pregnancy, which grows less toward the middle of gestation and becomes worse toward the end. Labor, however, should not be induced, as it results disastrously in most cases.

At the time of labor danger arises to the mother because with the removal of the child and appendages the blood-pressure is altered, the pressure in the aorta sinks, and the venous pressure increases. An unsound heart cannot accommodate itself to these changes.

The management of labor with these patients consists in delivering them as promptly as is safe. Anæsthetics should be used with caution, and the placenta should not be delivered by expression, but manually. Nitrite of amyl during labor is especially useful.

GYNECOLOGY.

UNDER THE CHARGE OF

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Vaginal Operation for Retroflexion.—SCHÜCKING (*Centralblatt für Gynäkologie*, 1901, No. 14) criticises all the common operations for the cure of retro-displacement from an obstetrical stand-point, including shortening of the round ligaments, vaginofixation and ventrofixation. He has abandoned his former operation in favor of the following procedure: After opening the vesico-uterine pouch the uterus is sharply anteflexed, retro-uterine adhesions being stretched or separated. A curved needle, devised by the writer, is passed through the broad ligament just below the origin of the round ligament, and is carried around the posterior aspect of the uterus to emerge at a corresponding point in the left broad ligament. When this is tied the uterus is anteflexed. The surface at the angle of flexion is freshened with a curette. The peritoneum becomes adherent at this point, and thus maintains the uterus in its normal position, without impairing the mobility of the organ. Five successful cases are reported, although there has been no opportunity to note the influence of pregnancy.

[It would seem as if the same objections could be urged against this operation as apply to other methods of vaginofixation—that it interferes with the normal development of the pregnant uterus. The evidence is insufficient to justify any positive opinion in its favor.—H. C. C.]

Medullary Anæsthesia in Gynecology and Obstetrics.—STANKIEWICZ (*Czasopismo Lekarskie; Centralblatt für Gynäkologie*, 1901, No. 14) reviews the literature of spinal anæsthesia and reports six cases of major and minor gynecological operations, in one of which anæsthesia was only partial. He does not approve of this method in the case of hysterical patients.

Double Hypertrophy of the Breast.—BARTEL (*Zeitschrift für Heilkunde*, Band xxi., Heft 7) has collected fifteen cases of double and five of unilateral hypertrophy of the breast, which he divides into two classes—those occurring at puberty and those in pregnant women. In the first class the affected breast presents the ordinary structure of a mammary adenoma; in the second, the appearance of the normal gland during lactation.

In a case reported by the writer the patient was fourteen years of age and had not menstruated. The hypertrophy of the breasts followed an attack of pneumonia in her eleventh year. They extended from the second to the ninth rib on either side. Two operations were performed, the combined weight of the two masses removed being over four pounds.

Ultimate Result of Radical Operation for Carcinoma Uteri.—JACOBS (*Revue de gyn. et de chir. abdom.*, 1900, No. 4) reports fifty-two cases with four deaths. Of those patients who recovered sixteen had died from a return of the disease; sixteen had a recurrence, and sixteen were in good health. The writer recommends a radical operation only in those cases in which the disease is strictly confined to the cervix. The indications are a healthy vagina and parametric tissues and a movable uterus.

When the mucous membrane of the canal is involved, as well as the submucous vaginal tissue and broad ligaments, high amputation should be performed.

OTTO (*Centralblatt für Gynäkologie*, 1901, No. 14) has collected the statistics of several Danish hospitals. One hundred and sixty-three cases are reported. Vaginal hysterectomy was performed one hundred and thirteen times, with twenty-four deaths, fifty-nine recurrences before five, and four after five years. The uterus was removed per vaginam nineteen times for cancer of the body of the organ, with two deaths and six recurrences. Nineteen high amputations were followed by sixteen recurrences within two years.

[The striking variation in the results described in these two papers can only be accounted for by a wide difference in the technique of the operation, as well as care in the selection of cases. It would certainly be most unfair to judge of the results of the modern treatment of cancer of the uterus by the unfavorable Danish statistics.—H. C. C.]

Atmokausis and Zestokausis.—PINCUS (*Centralblatt für Gynäkologie*, 1901, No. 16) reviews the subject in an extended paper in which he emphasizes the value of this method of treatment especially in cases of uterine hemorrhage which have resisted curettement. He affirms that no surgeon is justified in removing the uterus in cases of uncomplicated climacteric bleeding until atmokausis has been tried. It is also of great value in cases of interstitial fibroid in which radical operation is contraindicated.

Atmokausis is recommended in menorrhagia with subinvolution, because of its marked effect in reducing the size of the uterus.

The Action of Steam on the Uterine Mucosa.—KOSLENKO (*Centralblatt für Gynäkologie*, 1901, No. 17) describes the results of his experiments on dogs. Under anæsthesia the abdomen was opened, the anterior vaginal fornix was incised, and the cervix was drawn upward so that a tube connected with a steam boiler could be inserted into it. Through an incision in one horn of the uterus a thermometer was introduced into its cavity; at the same time the opposite cornu was isolated from the uterine cavity by passing a silk ligature around it.

With a pressure of 0 atmospheres in the steam-kettle the temperature of the uterine cavity rose to 100° C. and remained at that height for five or six minutes, when it slowly declined. When the pressure was raised to two atmospheres it reached 115° C., but fell in a few seconds. Strong uterine contractions were observed. The uterine muscle after a few seconds became pale, then grayish-red, and finally gray, showing that necrosis had occurred.

In a second series of cases uteri were extirpated at various intervals after atmokausis had been used for twenty seconds with a pressure of two atmospheres. On the first day partial destruction of the mucous membrane was observed; on the third day the necrotic areas were well defined; on the sixth the dead tissues were thrown off, and on the ninth regeneration of the endometrium had occurred.

The deeper portions of the glands were not affected, hence the rapid renewal of the mucosa. By controlling the pressure and the duration of the exposure any desired effect could be obtained, even obliteration of the uterine cavity.

Pulmonary Embolism following Myomectomy.—MICHEL (*Revue de gyn. et de chir. abdom.*, 1900, No. 4) believes that post-operative thrombosis is to be apprehended especially in the case of patients with large impacted tumors, who have been exhausted by loss of blood. Thrombosis of the pelvic veins is more dangerous than in those of the lower extremities. Persistence of rapid pulse after operation, with a low temperature, is the only symptom which might cause a suspicion of thrombosis. When this is noted the patient should be kept absolutely quiet in bed for several weeks.

Before any gynecological operation is performed a careful examination of the vascular system should be made, and if the patient has a rapid pulse, enlarged, resistant veins and œdema of the lower extremities it is wise not to operate.

Metastases in Cancer of the Cervix Uteri.—KUNZE (*Centralblatt für Gynäkologie*, 1901, No. 17) reports a case of epithelioma of the cervix with atresia of the os internum and resulting pyometra. After extirpation of the uterus numerous metastases were found in the corporeal endometrium. The parametric tissues were apparently free from disease.

Retroperitoneal Pelvic Tumors.—WINTERNITZ (*Centralblatt für Gynäkologie*, 1901, No. 17) describes two cases, one in which the tumor was a papillary cystoma presenting the ordinary appearance of an ovarian cyst, though no traces of follicles could be found in its wall. It was supposed to have developed from some aberrant cells, as there was no reason to infer the presence of a third ovary.

KRÖNIG (*Ibid.*) removed a subperitoneal retro-uterine tumor, leaving the uterus and both ovaries and tubes intact. It was a multilocular cystoma, which the writer inferred had developed from the remains of the Wolffian body, at first in the posterior wall of the uterus, but later being displaced into the cellular tissue of Douglas' pouch.

Ultimate Results of Vaginal Extirpation of the Cancerous Uterus.—REIPEN (*Centralblatt für Gynäkologie*, 1901, No. 17) presents the statistics of the Halle clinic up to 1897; 25.14 per cent. of the patients were free from recurrence. Between 1887 and 1900 there were 303 operations with twenty deaths (6.6 per cent.). Injuries to the bladder and ureters occurred in 8.91 per cent.

Infiltration of the parametric tissues as far as the pelvic wall and also of the bladder wall were regarded as positive contraindications to operation. One-third of all the cases received at the clinic were considered as operable.

The abdominal route is condemned, since with the improved modern technique the mortality is still 20 per cent.

Surgical Treatment of Procidentia.—CHRISTIANI (*Zeitschrift für Geb. u. Gyn.*, Band xliii., Heft 2) reports 143 cases of procidentia operated upon in the course of five years, 84 per cent. of which were kept under observation subsequently. In the majority of the cases colpo-perineorrhaphy and ventrofixation were performed. Of 83 patients thus treated 76 per cent. were permanently cured, while 87 per cent. were able to attend to their usual occupations—a result which has not been shown in any other similar series of cases.

Extension of Uterine Cancer through the Lymphatics.—PUPPEL (*Centralblatt für Gynäkologie*, 1901, No. 13) publishes the result of his histological studies in this field. He found that in cancer of the portio vaginalis those lymph-spaces are first affected which run in the middle muscular layer. The disease then extends either to the vagina or through the lymphatics to the parametrium. Metastases in the body of the uterus occur late, after the broad ligaments have already been affected, also through the medium of the lymph spaces in the middle and outer muscular layers.

As a practical deduction from these observations the writer recommends that supravaginal amputation be performed in old women in cases of operable carcinoma of the portio. If the posterior lip is involved he advises extensive removal of the parametric tissues. If the disease has extended as high as the os internum total extirpation is necessary.

Sensitiveness of the Peritoneum.—LENNANDER (*Centralblatt für Chirurgie*, 1901, No. 8), as the result of a series of experiments, concludes that while the stomach, intestines, mesentery, gall-bladder, and possibly the kidneys and liver do not receive impressions of pain, touch, heat, and cold, the parietal peritoneum is exceedingly rich in sensory nerves. Intestinal colic, he believes, is due to sudden stretching of these nerves associated with distention of a loop of intestine. Moreover, adhesions only give rise to pain when they cause a certain amount of stretching of the peritoneum. In acute peritonitis the extreme sensitiveness of the anterior abdominal wall on pressure is due almost entirely to the inflammation of the anterior parietal peritoneum.

OPHTHALMOLOGY.

UNDER THE CHARGE OF

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AND

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Glaucoma Induced by Cocaine.—J. HINCHELWOOD (Glasgow) reports the case of a woman, aged fifty years, suffering from asthenopia, in whom cocaine was used to dilate the pupils to obtain a good view of the fundus of the eye. A few hours later the eye became painful, and next morning presented the typical clinical picture of acute glaucoma. Eserin, followed by iridectomy, restored the normal tension of the eyeball, but not her previous normal vision.—*Ophthalmic Review*, November, 1900.

S. SNELL (Sheffield) reports a similar case, in which the cocaine had been prescribed to relieve discomfort of the eye, and a 1 per cent. solution had been instilled three times during the day. Eserin and iridectomy secured a satisfactory recovery of vision.—*Ophthalmic Review*, February, 1901.

[These cases illustrate very clearly the connection of mydriatics with glaucoma. The mydriatic excites glaucoma, because it dilates the pupil in an eye having a glaucomatous structure—that is, an anterior chamber so narrowed that the crowding of the retracted iris into the angle obstructs the outflow channels and so raises the tension of the eyeball. Cocaine is frequently used in the treatment of glaucoma, but for this purpose should always be combined with a myotic strong enough to prevent it from dilating the pupil. In such a combination its tendency to contract the vessels of the iris and render the iris thinner aids in opening the outflow channel, thus reducing the tension. But it should be remembered that the anæmia produced by cocaine is quite brief, and is followed by some tendency to hyperæmia. So that even combined with a myotic it should be used in glaucoma with great caution.

The diagnostic value of a mydriatic in glaucoma which I have before urged (see this JOURNAL, April, 1898) is also illustrated in the above cases. The possibility of glaucoma had been suspected in one of them, in the other it had not. The use of the cocaine gave unmistakable evidence of such a condition; then the iridectomy permanently cured the glaucoma. If the cocaine had not been used the glaucomatous process, following its common course, would probably have permanently damaged vision to a very serious degree before it was discovered, and when discovered might have been far less amenable to treatment.—ED.]

Tobacco Amblyopia.—C. E. SHAW (Belfast, Ireland) reports a case of well-marked toxic amblyopia in a boy, aged fifteen years, who had smoked cigarettes from the time he was eight years old. He also reports a case in a man, aged forty years, who smoked but one or two ounces of tobacco a week, having decreased his indulgence by one-half a year previously.—*Ophthalmic Review*, May, 1901.

[The great mass of cases of tobacco amblyopia occur after the age of forty, similar cases occurring earlier being largely due to alcohol; but in relation to poisoning we always have to remember that individual susceptibility is the supreme factor and capable of breaking all rules.—ED.]

J. H. FISHER (London) calls attention to the well-established observation that nicotine destroys the power of ganglion cells to transmit impulses. Professor Langley found that painting a ganglion with nicotine produced the same effect as injecting the drug into a vein. Stimuli applied on the proximal side of the ganglion or to the ganglion itself produced no effect; applied to the distal side of the ganglion they still proved efficacious. Painting of a nerve trunk with nicotine does not prevent the transmission of impulses. To explain the central scotoma of tobacco amblyopia, Fisher offers the supposition that visual impulses from the macula pass through the ganglion cells of the retina, while those coming from peripheral parts of the retina pass along more direct nerve paths without having to go through ganglion cells. He refers to the crowding of ganglion cells in the region of the macula and their comparative scarcity in the more peripheral parts.—*Ophthalmic Review*, June, 1901.

Ophthalmoscopical Changes in Pneumonia.—A. PETERS (Bonn) reports the case of a man, aged twenty years, who, during a rather light attack of pneumonia, noticed impairment of vision of the left eye. One month later he applied on this account, presenting a subsiding iritis. A mydriatic dilated the pupil except for two slender adhesions. The ophthalmoscope revealed evidence of a recent chorio-retinitis, involving the region around the optic disk, in which were seven large rounded, ill-defined, light-gray, prominent spots. Similar lesions were observed in a case reported by Fraenkel. Peters also reports one in which the spots were more sharply defined; but the fact that the pneumonia was complicated by tuberculosis rendered the nature of the lesions doubtful. The explanation offered regarding such lesions is that they arise from a pneumococcus embolism.—*Klinische Monatsbl. für Augenheilkunde*, May, 1901.

Malarial Diseases of the Cornea and Iris.—A. LE PRINCE (Bourges), although admitting these are much more rare than malarial diseases involving the retina and other deep structures of the eye, regards them as of considerable importance. They include iritis, a form of diffuse parenchymatous keratitis, and a form of corneal ulcer which he regards as identical with dendritic keratitis. He reports a case of the latter occurring in a woman, aged twenty-four years, shortly after confinement. The ulcer had the characteristic branching form, and improvement followed rather promptly upon the administration of quinine and arsenic.—*Annales d' Oculistique*, May, 1901.

[Le Prince makes no reference to what seems to be an important feature of these cases: the disturbance of the nerve-supply of the part. The sensibility of the cornea as tested with the twisted pledget of cotton is often, perhaps always, markedly diminished. We have recently seen a case in which this impairment of sensibility was confined to a segment of the cornea, and upon this segment all the ulcers were situated.—ED.]

Economic Valuation of Vision.—H. V. WURDEMANN (Milwaukee) discusses this extremely important and complicated subject, employing in the main the formulas suggested by Magnus. Absolutely perfect visual acuity is very rarely demanded to follow any occupation, while certain occupations require less than others. Wurdemann separates the common forms of employment into two groups: one requiring visual acuteness equal to 75/100 as the best condition or full ability for pursuing them, and for which vision of less than 15/100 constitutes total disability. In the second group vision of 50/100 gives full ability, and of 5/100 complete disability. For instance, a person whose acuteness of vision was reduced to 40/100 would, for occupations of the first group, possess an earning capacity of only 5/12, while for an occupation of the second group his earning capacity would be 7/9. For the first group the loss of one eye entails a loss of 30 per cent. of earning ability for the first year, and of 20 per cent. afterward; while for the second group the losses would be respectively 27 per cent. and 18 per cent. Limitation of the field of vision is also an important factor in damage to earning capacity. To exactly estimate the damage in the individual case the present earnings and also the probable future earnings must be considered. In this way the patient's age becomes an important element in the calculation. In actual practice still other circumstances, as contributory negligence, expense, and suffering incurred, etc., will also influence the estimate.—*Annals of Ophthalmology*, April, 1901.

[The just estimate of damage from loss of vision must always remain a difficult and complicated problem; but the larger the number of elements that can be estimated with mathematical exactness the better prepared will we be to properly weigh considerations that cannot be so stated. The reign of pure empiricism and mere whim in the estimation of damages will be shortened by such discussions, and all who are called upon to form such estimates, as in the rating of pension cases and the adjustment of compensation for accidental injuries, should carefully read this discussion in the original, since in many things it cannot be condensed.—ED.]

Congenital Condition Simulating Choked Disk.—C. H. BEARD (Chicago) reports a case in which the optic nerve entrance was entirely hidden in both eyes by a swelling of fully eight diopters. Careful investigation revealed no evidence of brain disease or other probable cause of optic neuritis. The patient has remained under observation for seven years without noticeable change in the ophthalmoscopic appearances, with no deterioration of vision, and now seems to be in perfect general health.—*Ophthalmic Record,* June, 1901.

[Cases of this character are of great importance on account of the risk of mistaking such a condition for optic neuritis, significant of grave cerebral or constitutional disease. Others of the kind have been from time to time reported, but none quite so pronounced as Beard's. Prolonged observation may be required to settle the question raised by such a case; but if one bears in mind that this anomalous condition may exist its true character may be suspected from the first examination. The important diagnostic point is the calibre of the retinal vessels. In choked disk the arteries are small, the veins dilated. This relative or absolute enlargement of the retinal veins is not absent in a case of optic neuritis from the time the distinct swelling of the optic disks begins until it passes over into a condition of optic atrophy. The excellent colored plate which accompanies Beard's article shows the absence of this symptom of choked disk, and when he first saw the patient he noted that "all the retinal vessels were a trifle smaller in calibre than is normal."—ED.]

Methyl Alcohol Amblyopia.—G. E. DE SCHWEINITZ (Philadelphia) reports a case in which the pathway of entrance of the poison was through the lungs and the cutaneous surface. The patient was a man, aged thirty-nine years, who for three years had worked exclusively at varnishing. The shellac he used was mixed with Columbia spirits, containing about 95 per cent. of methyl alcohol. Previously he had worked but three or four days at a time at shellacing, but for two months prior to his blindness he had been exposed to the fumes daily. He had frequently noticed attacks of dizziness, vertigo, and, as he expressed it, "drunkenness" when he shellaced in enclosed spaces, particularly in warm weather; but no such attack had been experienced within two weeks prior to his blindness. The clinical features of the attack were the same as have been noted after more acute poisoning with this drug. The onset of blindness was quite sudden; there was a period of partial recovery, but in the end the blindness became quite complete. This patient, beside inhaling the fumes, had been accustomed to wash the stains from his hands, and sometimes had washed his face in the wood alcohol.—*Ophthalmic Record,* June, 1901.

A. BIRCH-HIRSCHFELD (Leipsic), from an experimental study of the action of methyl alcohol upon the visual apparatus of dogs and chickens, concludes: That the appearauces of degeneration are presented in the nerve-cells of the retina before any alteration can be found in the trunk of the optic nerve. Later the degeneration is found in a certain part of the section of the nerve, but not involving all the bundles. The degenerated portions of the optic nerve show no signs of an inflammatory process, neither exudation, infiltration, nor alteration of the vessels. Both in its clinical aspects and anatomical changes methyl alcohol poisoning closely resembles that produced by ethyl alcohol.—*Graefe's Archiv für Ophthalmologie,* Band lii., Heft 2.

HYGIENE AND PUBLIC HEALTH:

UNDER THE CHARGE OF
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Dissemination of Bacteria by Ordinary Air Currents.—An extensive series of experiments by DR. R. F. HUTCHISON (*Zeitschrift für Hygiene und Infectionskrankheiten*, xxxv., p. 223) on the dissemination of bacteria in indoor and outdoor air and on the transmission of infection by mail yielded some interesting results. The organism used was *B. prodigiosus*, cultures of which, diluted with water, were sprayed into the air. A closed book with matches placed between the leaves so as to make openings 5 mm. in height, into which slips of sterile paper were inserted, was exposed for two hours at a distance of about eight feet from the place where the organisms were discharged into the air of the room, and then the papers were withdrawn and planted. The results were positive. Sheets of paper were exposed to the air and then placed in sterile envelopes and sent away by mail to both near and distant points, from which, without having been opened, they were immediately returned. In one case the round trip required twenty hours; in the other, six days. The sheet which made the shorter journey yielded an abundance of the organisms, but the other gave negative results. Hence infection by mail is possible, but the duration of life of the transmitted organism will, of course, depend upon the individual resistance of the particular species. Two sterilized sheets sent over the same routes and returned unopened as before, yielded in both cases a number of colonies of bacteria and moulds, thus showing that infection of letters in transit is, to some extent, possible.

Bacteria sprayed upon objects in the form of minute droplets were found to perish in a short time, the main factor in their destruction being the influence of sunlight. On Petri plates protected from the light, *B. prodigiosus* was found active after seven days, while in those exposed to it for one or two days no living organisms were found. Wall-papers, especially those with a rough surface or raised patterns, may become extensively infected in a very short time from an atmosphere into which bacteria are discharged by spraying, but most of the organisms were found to live but a short time.

When the air of the room was allowed to remain undisturbed, most of the organisms were found to have settled out within half an hour; but it was observed that slight unavoidable air currents in the lower strata will keep numbers of them in suspension for considerable periods. Other factors which may influence the length of time bacteria may remain in suspension are the amount of moisture present and the size and specific gravity of the organisms. Provided the air currents are favorable, suspended bacteria may be conducted through very narrow crevices. Thus Petri dishes placed in closed bureau drawers became infected, the organisms having been conveyed through the surrounding chinks.

Experiments were performed to ascertain to what extent bacteria resting upon the floor and in the cracks between the boards thereof are thrown into the upper air by the act of walking, and it was found that those thrown up by the elastic rebound of the boards failed to infect plates suspended at a height of 10 cm., while those much nearer were extensively infected. Other experiments proved the passage of bacteria from one room to another through the keyhole and crevices of the closed door leading from one to the other. While the danger of disseminating bacteria by walking over an infected floor was shown to be slight, ordinary sweeping was found to contaminate the atmosphere through its whole extent, even to the ceiling; hence, dry sweeping is to be carefully avoided in the sick-room. Rapid passage from an infected atmosphere in a straight line will draw bacteria along through considerable distances. In the open air, collections of bacteria are inclined to float along in a more or less concentrated mass, even in an apparent calm, and may be carried by very slight currents of air as far as 600 metres.

A somewhat similar series of experiments by DR. F. KIRSTEIN (*Zeitschrift für Hygiene und Infectionskrankheiten*, xxxv., p. 123) yielded results closely in agreement with those of Hutchison. Kirstein concludes that the ordinary air currents which occur in dwellings cannot detach living organisms from surfaces upon which they have become deposited and dried, but concedes that, when bacteria in culture media are sprayed upon fine dust particles, they may, in some instances, be disseminated, since dust is so readily blown about. Yet how slight the danger of this method of infection is, so far at least as typhoid fever is concerned, is shown by the marked rapidity with which the typhoid organisms die when sent forth in the form of spray. The longevity of organisms varies enormously, according as they are dried in compact masses or well spread out. The non-spore builders, when thrown into the air in the finest droplets, as when sprayed, retain their vitality for only a comparatively short time, because of the direct influence of light and air, the time varying, of course, according to species. The marked sensitiveness of the tubercle bacillus to the influence of light makes the early destruction of this organism most probable when it is thrown into the air in the form of minute droplets, and thus can be explained the fact that even in consumptive wards, in which there is without doubt a constant discharge of the bacilli into the air, attempts to detect living organisms in the dust, etc., fail, excepting in those cases in which the sputum itself has, through lack of care, become disseminated. In the same way can be explained why infection does not oftener occur among the associates of consumptives who constantly cough—chiefly because of the rapid death of the bacilli when exposed in the finest droplets.

Sanitary Significance of the Colon Bacillus in Drinking Water.—The truth of the assertion of W. Kruse that the colon bacillus is in no way characteristic of fecal matter, and exists everywhere, in the air, water, and soil, and of the statement of Miquel that one can always find it in water, provided a sufficient volume is examined, is, to a certain extent, borne out by a research conducted by DR. J. WEISSENFELD (*Zeitschrift für Hygiene und Infectionskrankheiten*, xxxv., p. 78) under the direction of Professor Kruse. Thirty waters of good character and twenty-six of bad were examined for the organism, and in every specimen it was found present, though the amount of water from which it could be isolated differed widely. With bad waters and with many good ones (from deep-driven wells for example) as well, the organism could be found in each cubic centimetre; but most of the good specimens yielded it only when large volumes were planted. The results of animal experimentation followed no rule. It happened sometimes that the bacilli from good waters were very pathogenic to guinea-pigs, while those from bad waters might be quite indifferent. Pathological and bacteriological examination of animals which were killed by cultures from good and bad waters revealed no differences, the results being the same in both classes as are observed in experiments with fecal bacteria. Hence it cannot be asserted that the finding of virulent colon bacilli in drinking-water necessarily indicates fecal contamination.

The Importance of Uncooked Vegetables in the Spread of Parasites and Infectious Diseases.—DR. G. CERESOLE (*Il Policlinico*, 1900–1901, p. 55) records additional evidence of the possible danger of the spread of parasites and infectious diseases through consumption of uncooked vegetables. He obtained lettuce, endives, radishes, and celery as sold in the market after the usual method of cleaning, and washed them in sterilized water. On examination of the sediment the microscope revealed an extensive fauna and flora. Among the objects observed were amœbæ, thread worms, eggs of tænia, oxyuris, and anchylostomum, and a great variety of micrococci, streptococci, staphylococci, bacilli, and sarcinæ. He isolated *B. coli communis*, a bacillus which agreed in characteristics with that of typhoid fever, the bacillus of tetanus, and *B. septicus*. As a precaution against danger, he advises that vegetables which are to be eaten uncooked be first washed and then immersed for half an hour in a 3 per cent. solution of tartaric acid, which agent has been shown to have the power to disinfect completely salad vegetables artificially infected with the spirillum of cholera.

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FILARIAL LYMPHATIC VARIX.[1]

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SINCE Demarquay[2] discovered embryo filariæ in chylous fluid from the tunica vaginalis, numerous observers, in great part English physicians residing in the British colonies, have demonstrated the frequency with which filarial infection occurs in tropical countries. In 1868 Wucherer[3] noted the presence of filariæ in chylous urine, and in 1879 Lewis[4] recorded their presence in the blood. It was not until 1876 that Bancroft,[5] examining a suppurating lymphatic varix of the arm, found the adult female worm to which Cobbold, recording the discovery, gave the name Filaria bancrofti.

The parasite has a wide geographical distribution and infects a large proportion of the population of many tropical countries. Manson,[6] in his work on tropical diseases, has collected observations demonstrating the prevalence of filaria on the East and West African coasts, in Morocco, India, Ceylon, the Islands of the South Pacific, British Guiana, and the West Indies. It has been observed in many other tropical countries. In Cochin, a district of Southern India, Manson found one-third of the inhabitants infected, and in Samoa one-half of those examined, while Thorpe[7] in the Friendly Islands found filarial hæmatozoa in the blood of 32 per cent. of natives. A large proportion of infected individuals appear to be in good health, but a variety of pathological conditions with which the parasite has been found associated are undoubtedly caused by its presence.

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[1] Read at the Sixteenth Annual Meeting of the Association of American Physicians, held at Washington, D. C., April 30 to May 2, 1901.

[2] Gaz. Méd. de Paris, 1863, vol. xviii. p. 665.

[3] Gazeta medica da Bahia, December 15, 1868, p. 97.

[4] Indian Annals of Medical Science, Calcutta, 1873-74, vol. xvi. p. 504.

[5] Cobbold. Lancet, 1877, vol. lxviii. pp. 70, 495.

[6] Tropical Diseases. London, 1900.

[7] British Medical Journal, 1896, vol. ii. p. 922.

Numerous investigations have shown that Filaria bancrofti requires two hosts in order to complete the cycle of its life-history. Embryo filariæ are withdrawn from the human body by a blood-sucking insect —the mosquito—and in its body undergo a series of developmental changes. The adult male and female filaria, macroscopic nematodes several inches in length, have been repeatedly found within the dilated lymphatic vessels of the human host. Almost the entire body cavity of the female is occupied by a uterus filled with ova and embryo parasites in various stages of development. The minute worm-like embryos, containing no recognizable organs and enclosed in a delicate sheath, are poured in great numbers into the lymphatic vessels, and hence reach the bloodvessels, where, owing to their small diameter, about that of a red blood-corpuscle, they circulate freely through the capillary vessels. Manson[1] has shown that when blood containing embryo filariæ is drawn into the stomach of the mosquito the parasite loses its sheath, and by active movements makes its way through the stomach wall into the thoracic muscles of the insect, where it undergoes changes by which it acquires a digestive tract and other rudimentary organs. Low[2] has recently found that the parasite makes its way into the head of the mosquito and lies in the loose connective tissue below the cephalic ganglion and salivary duct, finally penetrating the proboscis, where it may be demonstrated by appropriate sections. Here two worms are almost constantly seen together. Manson's early investigations have been, it is well known, the incentive for much of the research which has demonstrated that the mosquito is an intermediate host of the malarial parasite and transfers the protozoon from one human host to another. The discovery of the partially developed parasite in the proboscis of the mosquito indicates that this filaria follows the analogy of the malarial organism, and is transmitted from one individual to another by certain species of mosquitoes, in which it passes the entire period of its existence outside the human body. Investigations of James[3] have confirmed and extended Low's observations.

Low studied the development of Filaria bancrofti in the mosquito Culex ciliaris; James, in Culex microannulatus and Culex albopictus. James has shown that mosquitoes of the genus Anopheles may harbor filariæ, and has traced the development of the parasite in Anopheles rossii. It is, therefore, not improbable that a considerable number of different species may act as intermediate host to Filaria bancrofti. Every infected individual becomes a source of danger to the community in which he lives should an appropriate species of mosquito thrive in the same locality. Constantly increasing intercourse between the United States and tropical countries, notably the West Indies and the Philippine Islands, gives increased importance to this possibility.

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[1] Cobbold. Lancet, 1878, vol. lxix. p. 69.

[2] British Medical Journal, 1900, vol. i. p. 1465.

[3] Ibid., vol. ii p. 533.

Filarial infection is prevalent throughout the West Indies. Guitéras[1] found filariæ in the blood of four Cubans residing at Key West. A case described by Young[2] was that of a resident of Jamaica. The disease appears to be prevalent in the Windward and Leeward Islands. Flint[3] has reported a case from the Island of St. Kitts. Manson[4] examined specimens of the blood from twenty-eight inhabitants of the Island of St. Kitts and Montserrat, and in six found filariæ. In one hundred and fifty-two specimens from the Island of St. Vincent filariæ were found in six. Galgey[5] has found similar parasites numerous in the Island of St. Lucia. The patient of Lothrop and Pratt[6] had lived on the Island of Barbados. The patient whose case is to be described was a native of the Island of St. Thomas.

There is little doubt that the disease prevails to a limited extent in the Southern States, and in a number of instances infection has been acquired within this country. Guitéras found filariæ in the blood of a mulatto, a native of Charleston, S. C., who, though he had lived only in South Carolina and Georgia, suffered with chyluria. In the blood of a second negro suffering with hydrocele Guitéras found filariæ. De Sassure[7] has described twenty additional cases of filarial infection occurring in residents of Charleston, S. C., and in all but two cases the infection was undoubtedly acquired within the United States. Mastin[8] records the case of a white man who had never lived outside of Mobile, Ala., and its immediate vicinity; filariæ were found in chylous fluid withdrawn from the tunica vaginalis. Henry[9] describes a case of filarial chyluria in a girl who had lived only in South Carolina, Florida, and Pennsylvania. Two cases of chyluria with filariæ in the urine are described by Slaughter.[10] The infected individuals had for at least twenty years lived in Virginia a short distance from Washington, and gave no history of having visited any tropical country. Even more surprising is the case described by Dunn.[11] His patient, who had suffered with filarial chyluria, had never been outside of Pennsylvania, and had spent her entire life in Philadelphia. Winn[12] discovered filariæ in the urine of a patient suffering with chyluria who had resided in the Northern and Western States.

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[1] Medical News, 1886, vol. xlviii. p. 395.

[2] British Medical Journal, 1897, vol. i. p. 1037.

[3] New York Medical Journal, 1895, vol. lxi. p. 737.

[4] British Medical Journal, 1897, vol. ii. p. 1837.

[5] Ibid., 1899, vol. i. p. 146.

[6] AMERICAN JOURNAL OF THE MEDICAL SCIENCES, 1900, vol. cxx. p. 525.

[7] Medical News, 1899, vol. lvi. p. 704.

[8] Annals of Surgery, 1888, vol. viii. p. 321

[9] Medical News, 1896, vol. lxviii. p. 477.

[10] Ibid., 1891, vol. lix. p. 649.

[11] Transactions of the College of Physicians of Philadelphia, 1898, vol. xx. p. 80.

[12] Indiana Medical Journal, 1896, vol. xiv. p. 409.

A case of filarial infection imported from the West Indies has recently been studied in the Pathological Laboratory of the Johns Hopkins Hospital. Since the condition is so rarely encountered in this locality, it was not suspected during life, and unfortunately no observations were made upon the living parasite. Few autopsies have been performed on subjects of filariasis, and the pathology of the associated conditions is not well understood.

Clinical History. Male, aged twenty-four years. The patient was admitted to the Johns Hopkins Hospital in the service of Dr. Halsted complaining of abdominal pain and distention. No very definite personal history was obtainable. He was born of Danish parents on the Island of St. Thomas, one of the Danish West Indies. For the past few years he had lived in this country. He has repeatedly had what he describes as "spasms." He has had, he says, a hernia for eight years. The patient was brought to the hospital in an ambulance, Sunday, March 3d. He was well and able to work until the preceding Thursday, when in the evening he had a chill and went to bed. During the "spasm" which followed, his hernia, he says, came down and has not since been reduced, though an attempt was made by a physician. Since Friday he has had severe abdominal pain, has vomited frequently, the vomitus having, it is said, a fecal odor. The bowels have not moved since Thursday morning. Urine was voided with some difficulty and pain.

The patient is a sparely-built man of swarthy complexion. His temperature on admission is 104.2° F.; the pulse, of poor volume, is 136 to the minute. The percussion note over the lower right back and axilla is flat and high-pitched, and the breath sounds distant. The abdomen is symmetrically distended and tympanitic. The spleen is not palpable. White blood-corpuscles number 20,800. In the right groin is a visible tumor consisting of two parts. One part, a rounded mass lying immediately below Poupart's ligament, is 3 cm. in diameter and tender to the touch. It gives no impulse on coughing, but appears to have a slightly resonant percussion note, and was thought to be a strangulated femoral hernia. The second part of the tumor lying below the saphenous opening measures 8 by 3 cm., and feels like a mass of enlarged lymphatic glands. Both testicles can be felt. The left epididymis is somewhat smaller than the right.

An exploratory incision under cocaine anæsthesia was made over the supposed hernia. It was found to consist in part of a mass of dilated channels containing clotted blood, often of chocolate color, in part of denser tissue of spongy texture. This new growth apparently followed the femoral vessels and extended a short distance along the saphenous vein. A part of the mass was removed, the wound was partially closed, and iodoform gauze was inserted into its lower angle.

Since the symptoms indicated the existence of general peritonitis, on the following morning an exploratory incision was made in the median line of the abdomen. Pus and fibrin were found in all parts of the peritoneal cavity, but careful examination of the abdominal viscera failed to reveal any cause for the peritonitis present.

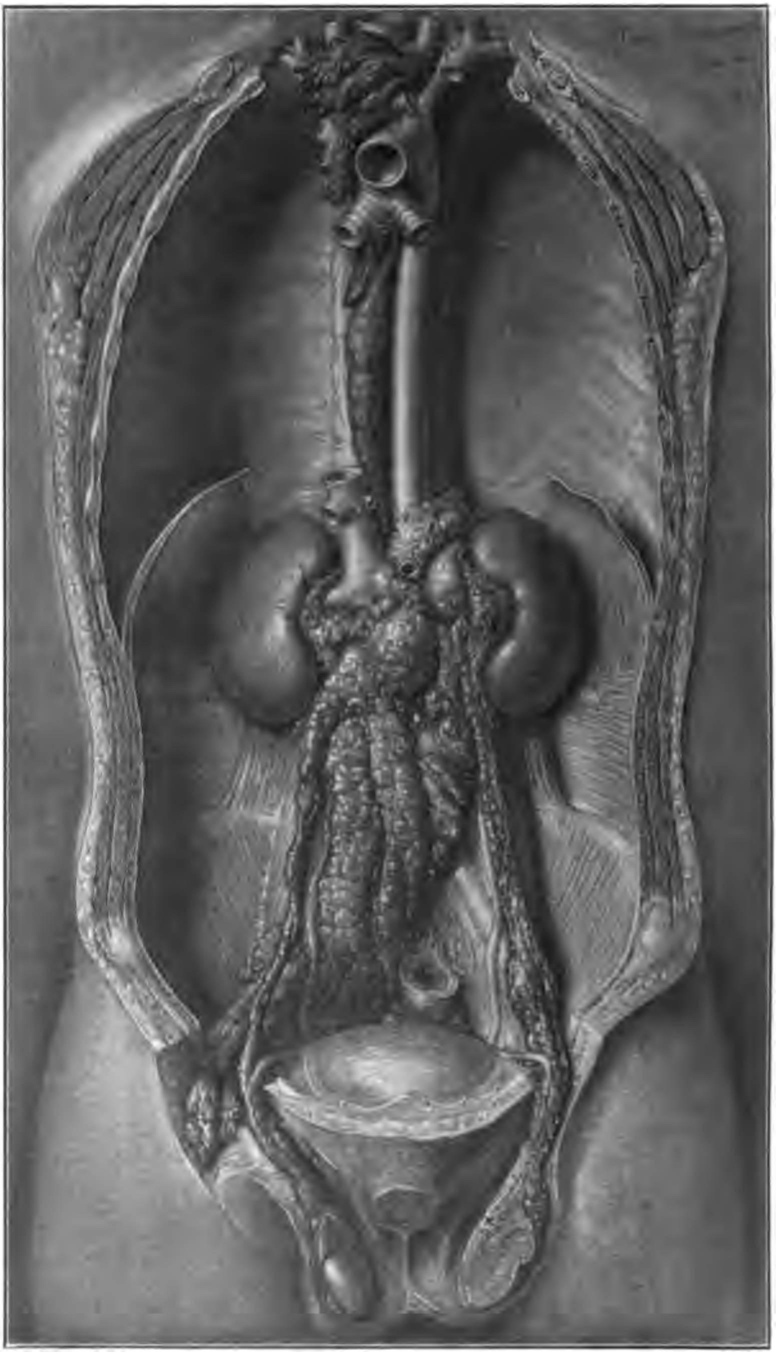
The patient remained weak and restless after the operation. The white blood-corpuscles counted three times numbered from 16,400 to 21,000. The temperature fell to 98° F. after the second operation, but rose to 103.9° F. shortly before death, which occurred on the following day. The urine contained a small quantity of albumin and a few casts, but other alterations were not noted.

Autopsy. The body is that of a sparely-built, well-nourished man. In the right inguinal region is a linear incision, the upper part of which is closed by silver wire. The lower part is open, and from it can be squeezed thin, turbid fluid. The exposed fat is deep red and injected. Through the abdominal wall near the median line is a second closed incision.

The peritoneal cavity contains about 50 c.c. of opaque, yellow fluid. The omentum and several loops of the intestine are lightly adherent to the anterior abdominal wall near the wound, and in places adjacent peritoneal surfaces of the omentum and intestine are lightly held together by fibrinous material. The peritoneal surface is dull, and here and there is covered by fibrino-purulent exudate in small amount. Minute vessels are injected and subserous ecchymoses are numerous. The appendix, curled up in the iliac fossa, is normal in appearance. The right pleural cavity contains no excess of fluid. Its parietal and visceral surfaces are dull and lightly bound together by fibrinous exudate resembling that of the peritoneum, and most abundant over the basal surface of the lung. The left pleural and pericardial cavities show no evidence of inflammation.

The heart weighs 270 grammes. Below the epicardium are numerous ecchymotic points. The valves are delicate. The lungs, resembling one another closely, are deep red in color and exude bloody serum, but are crepitant throughout. The bronchi are slightly injected. The surface of the liver is smooth and of a yellowish-red color, studded with minute ecchymoses. The spleen is not enlarged, weighing 150 grammes, and its capsule is thickened and fibrinous in places. The stomach and intestines are normal throughout. The pancreas is firm in consistence, compact in texture, and of a uniform grayish color. Near the upper border of the head of the organ is an enlarged lymph gland, hemorrhagic on section, and 1.5 cm. in diameter. The mesentery contains lymphatic glands, which are firm, gray-white, and occasionally 1.5 cm. in diameter. No abnormality of the lacteal vessels is noted.

After exposing the retroperitoneal tissue by removal of the above-named organs there is seen a diffuse and extensive new growth, which was previously inconspicuous. It occupies the entire space between the kidneys, and extends along the renal vessels into the hilum of the right. It is in direct contact with both adrenals, but does not invade them. It extends downward in front and on either side of the aorta and vena cava as far as the promontory of the sacrum, and has an average width of 5 cm. and a thickness of only 1 to 1.5 cm. An extension passes into the pelvic cavity to the right of the median line, and forms a flattened mass lying behind the ureter and between the bladder and pelvic wall, having here an average thickness of about 2 cm. The tumor tissue completely embeds the aorta and vena cava below the level of the renal vessels, and sends a lappet in front of the right ureter. It can be readily dissected from the structures with which it is in contact. When the adherent areolar tissue and fat are



The accompanying drawing, which accurately reproduces the appearance of the lymphatic varix described, has been made by my friend, Mr. Max Brödel, to whom I desire to express my obligation. It shows the entire varix in situ. A section for microscopic examination, from the position marked ×, immediately above the left epididymis, contained the adult worm occupying a dilated lymphatic vessel.

removed from its surface the appearance is that of a mass of thin-walled dilated and tortuous vessels containing dark thrombus material. Convolutions projecting forward give a nodular aspect to the surface. The tissue is flaccid in consistence, but tough, and on section is found to consist of dilated trabeculated channels, usually 2 to 5 mm. in diameter, lined by smooth endothelium and containing firm thrombus material of dark-red or reddish-brown color. They are held together by a varying amount of fibrous tissue, in which fat is abundant. A flattened continuation of the tumor follows the femoral vessels under Poupart's ligament, covering them for a short distance and lying in the wall of the wound previously mentioned. In this tissue is embedded a lymph gland about 1.5 cm. in diameter. From the tumor mass in the region of the kidney a strand of dilated thrombosed channels resembling those elsewhere passes down along each spermatic vein to the testicle, and forms in contact with the epididymis a spongy fibrous mass which is larger on the left than on the right side.

To the right of the aorta a continuation of the varicose tissue within the abdomen extends upward through the diaphragm and expands slightly immediately above to form a smooth cylindrical mass 2 cm. in diameter, composed of dilated thin-walled sinuses, the lumina of which are broken by irregular trabeculæ and contain brownish thrombus material. This relatively smooth mass lies to the right of the aorta for a distance of 10 cm. above the diaphragm and then becoming irregular in outline, as if composed of separate dilated channels, passes behind the arch of the aorta to the left side of the œsophagus and trachea. The dilated vessels which form it pass between the left subclavian, left carotid and innominate arteries and form in front of them a small mass resembling the tumor tissue elsewhere. In removing the specimen the veins at the base of the neck were cut so that their relation to the tumor mass, which evidently represents the enlarged varicose thoracic duct, could not be definitely determined. At one point there is a communication between a vein occupying approximately the position of the left subclavian and the varix. The orifice in the wall of the vein is about 2 mm. in diameter, and gives entrance to a dilated channel which is filled almost to the surface of the vein by thrombus material resembling that found in the dilated channels elsewhere.

The kidneys, ureters, and bladder appear to be normal. The aorta is smooth throughout, and the inferior vena cava is normal.

Microscopical Examination. Sections made from various parts of the varix-like tumor show that it consists of thin-walled vessels held together by loose areolar tissue containing fat. The vessel walls are formed in great part by fibrous tissue, but contain smooth muscle, often in considerable quantity. (Hypertrophy of muscular tissue is described by Lothrop and Pratt, *loc. cit.*) The lining endothelium is represented by oval nuclei seen at intervals. These vessels have not the structure of veins nor of arteries. Occasionally the smaller channels do not have distinct walls, and are simply dilated spaces within the connective tissue. The lumina are filled with red blood-corpuscles and polynuclear leucocytes in great number lying in a rich network of fibrin. Lymphoid cells occur in small number, and here and there are large endothelioid cells with vesicular nuclei. Sections stained by Weigert's fibrin stain demonstrate the presence of diplococci in great numbers, both free and within leucocytes. The dilated lymphatic vessels are embedded in fibrous tissue which is infiltrated with polynuclear leucocytes, often very numerous and mingled in places with fibrin and red blood-corpuscles. Occasionally the tissue is denser and more fibrous and contains lymphoid cells.

A section through the varix in contact with the left epididymis shows dense interstitial tissue containing numerous lymphoid, plasma, and eosinophile cells. The section passes through a dilated lymphatic vessel which contains what is immediately recognizable as at least one much-coiled nematode worm cut many times. The body is formed by a musculocutaneous tube covered by a thin cuticle. Its most conspicuous anatomical feature is the bilobed uterus filled with ova and embryos in various stages of development. Some of the latter are coiled up within an oval sac, while others lie stretched out parallel to one another. In all sections the alimentary canal is recognizable as a slender tubule whose cells contain pigment. Several sections appear to belong to a second smaller worm. Its digestive tract is larger, and there is within the musculocutaneous body only one other tubular organ.

Sections from various organs were carefully examined for embryo filariæ. In a small hepatic vein was found a portion of a small worm-like body composed of a cuticle surrounding a central nucleated strand and identical in structure with the intra-uterine embryos.

Bacteriological Examination. Stained smear preparations of the exudate in the pleural and peritoneal cavities contain very numerous capsulated lanceolate diplococci. Cultures from the lymphatic varix studied by Mr. Warfield Longcope contain diplococcus lanceolatus in pure culture. Diplococcus lanceolatus and staphylococcus pyogenes albus were obtained from the peritoneal cavity.

Pathological Diagnosis. Filariasis; lymphatic varix involving thoracic duct, retroperitoneal lymphatic vessels of the abdomen and pelvis, of the spermatic cord and of the right groin; adult Filaria bancrofti within a dilated lymphatic vessel; embryo filaria in a branch of the hepatic vein. Terminal infection of lymphatic varix with diplococcus lanceolatus; fibrino-purulent inflammation of the peritoneum, right pleura and tunicæ vaginales.

A clinical condition referable to the parasite was the presence of a tumor mass in the right groin which, according to the patient's statement, had been for eight years supposed to be a hernia. Autopsy demonstrated the existence of an immense plexus of enormously dilated lymphatic vessels lying in the abdomen and pelvis in front of the vertebral column. Continuous with this plexus was the distended varicose thoracic duct passing beside the aorta to the base of the neck. Dilated lymphatics held together by fibrous tissue followed both spermatic veins as far as the epididymis, and a similar mass of lymphatic vessels passed with the femoral vein and artery under Poupart's ligament and formed the mass which during life was mistaken for a hernia. An adult filaria occupied a dilated lymphatic vessel near the right epididymis, and a single embryo was found in a bloodvessel of the liver. The entire lymphatic varix was the seat of acute inflammation characterized by the accumulation of polynuclear leucocytes in the distended vessels and in the intervening tissue. The lymphatic vessels were filled in great part with blood, and had everywhere undergone thrombosis. Bacteriological examination demonstrated infection with diplococcus lanceolatus; secondary infection of the serous cavities in contact with the varix had occurred, and death resulted with acute fibrino-purulent inflammation of the peritoneum, right pleura, and both tunicæ vaginales.

Since the parasites in the preceding case were not studied during life, and were only observed in sections of the tissues obtained at autopsy, it was not possible to determine the details believed by Manson to distinguish different species of filaria. The sexually mature parasite discovered by Bancroft was described by Cobbold and given the name Filaria bancrofti. This nematode is known to be the parent form of the embryonic worms which Lewis had previously found in the blood. Filaria sanguinis hominis, the name originally proposed by Lewis and most commonly employed to designate filarial hæmatozoa, being trinomial, is not acceptable to zoölogists as a designation for the species. Manson,[1] who has carefully studied embryo filariæ from the blood of many individuals inhabiting widely separated tropical countries, has arrived at the conclusion that there are at least four, possibly five, distinct species of filaria, embryos of which circulate freely in the blood. His distinctions concern the disappearance of the parasite from the blood during certain periods of the day, its size, the presence or absence of an enveloping sheath, and certain details of shape and of structure.

Manson[2] discovered the remarkable fact that filariæ disappear from the blood during the day, though they may be found in large numbers during the night. Examinations repeated at intervals during the day and night demonstrate the periodic disappearance of the embryos from the cutaneous circulation. Appearing at six or seven o'clock in the evening, and gradually increasing in number, they reach a maximum at midnight. A gradual diminution in number then occurs, and at eight or nine o'clock in the morning they have entirely disappeared. Subsequent observers have confirmed the occurrence of this phenomenon. From an observation made upon an infected individual who committed suicide at 8.30 A.M., Manson[3] thinks it probable that the majority of the parasites accumulate during the day in the lungs. Stephen Mackenzie[4] made the important observation that this periodicity might be reversed by reversing the habits of the infected individual, causing him to sleep during the day and remain awake and take his meals during the night. Filarial embryos then become abundant during the day, but are absent from the cutaneous blood during the night.

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[1] Lancet, 1891, vol. i. p. 4, and British Medical Journal, 1897, vol. ii. p. 1837.

[2] Transactions of the Pathological Society of London, 1881, vol. xxxii. p. 285.

[3] British Medical Journal, 1899, vol. ii. p. 644.

[4] Loc. cit.

Manson subsequently found that the occurrence of this periodic disappearance of filariæ is not a constant phenomenon even when the habits of the infected individual undergo no purposeful change. In the great majority of cases, notably in individuals infected with various forms of lymphangiectasis, chyluria, and chylous hydrocele often demonstrably associated with the presence of the adult worm described by Bancroft in the infected lymphatics, the phenomenon of periodicity occurs, and to this parasite Manson has given the name Filaria sanguinis hominis nocturna, the prior binomial name being Filaria bancrofti. In the blood of three negroes from the west coast of Africa, Manson[1] found an embryo parasite which morphologically resembled the nocturnal form, but presented a reversed periodicity, appearing during the day, though absent during the night. Manson designates the parasite Filaria sanguinis hominis diurna. It is not inconceivable that some peculiarity of the infected individuals may have caused this alteration of the parasite. Manson's suggestion that Filaria loa is a parental form of this embryo has very little in its favor.

In natives of the west coast of Africa Manson found a third variety of hæmatozoa which does not disappear from the blood during either day or night, and has been designated by him Filaria sanguinis hominis perstans. It is much smaller than the previously mentioned parasites, possesses no sheath, is more actively motile, has a truncated tail, presents certain peculiarities of the oral apparatus, and does not possess the granular aggregation which in other forms has been found near the mid-part of the body.

In blood obtained from inhabitants of an island of the West Indies, St. Vincent, Manson[2] has described what he believes to be a fourth species, and has given it the name Filaria demarquayi. It has a pointed tail and is shaped like Filaria nocturna, but is less than half as large and has no sheath. It is present in the blood day and night. In the blood of aboriginal Indians from the interior of British Guiana he thinks that he has distinguished still a fifth variety. This was associated with a blunt-tailed embryo which he identified with his Filaria perstans of the west coast of Africa, the two being often found together on the same slide. This fifth variety, which he calls Filaria ozzardi, resembles very closely his Filaria demarquayi, and he thinks may be identical with it, though characterized by certain peculiarities of shape, size, and staining reaction which he does not clearly define. Galgey[3] found on the Island of St. Lucia what he believed to be Filaria demarquayi, and concluded that it was identical with specimens of Filaria ozzardi sent to him for comparison.

[1] Lancet, 1898, vol. i. p. 4.

[2] British Medical Journal, 1897, vol. ii. p. 1837.

[3] Loc. cit., 1899, vol. i. p. 145.

At the post-mortem examination of two British Guiana aborigines whose blood contained the two forms designated by Manson, Filaria perstans and Filaria ozzardi, Daniels[1] found in one case in the mesentery and in the fat at its base, in the other in the pericardial fat as well, male and female nematodes, which he believes are the parental forms of Filaria perstans. The uterus of the female contained only blunt-tailed embryos. The adult worm, which was more slender than Filaria bancrofti, and, unlike the latter, was provided with a slightly bulbous tail having a thickened cuticle prolonged into two triangular appendages. In a third case of similar character Daniels[2] found in addition to what he believed to be adult Filaria perstans a female and portion of a male located in the subperitoneal connective tissue of the anterior abdominal wall. The female closely resembled in size and shape Filaria bancrofti, but since the tail was slightly bulbous Daniels believed it to be a different species, the parent form of the blunt-tailed embryo, Manson's Filaria ozzardi.

The specific peculiarities of the filaria described evidently require further investigation. Periodic disappearance from the blood may be dependent upon peculiarities of the host. Male and female embryos of the same species may have slight morphological differences.

In the left ventricle of a child who died in Rio Janeiro, Magalhaes[3] found male and female sexually mature filariæ, of which he has given a careful description. They are much larger than Filaria bancrofti and differ in details of structure. The child's blood was not examined. From analogy it is not improbable that the parasite discharged embryo worms into the blood, but their relation to the forms which have been described by Manson is entirely unknown.

Filariæ were discovered by Demarquay in chylous hydrocele fluid. Wucherer found embryos in the urine of a case of tropical chyluria; Lewis, who first found filariæ in the blood, observed their frequent association with chyluria and with the so-called lymph scrotum, a condition in which the scrotum contains a mass of tortuous and dilated lymphatic vessels, the tunica vaginalis being often distended with serous or chylous fluid. Subsequent observations have demonstrated the association of filaria with various forms of lymphatic varix. These occur in a variety of situations—in the groin, in the axilla, and more deeply seated within the abdomen and thorax. Embryo filariæ are found both in the fluid from the varix and in the blood of the infected individual, while in a considerable number of cases (collected by Lothrop and Pratt) the adult worm has been found. When it has been possible, as in the present case, to determine the location of the sexually mature parasite it has been found to occupy a dilated lymphatic vessel. The parasite associated with the above-named conditions has been identified as Filaria bancrofti, the embryos of which appear in the blood at night—Filaria sanguinis hominis nocturna of Manson. Though in the case herewith described it was not possible to determine the specific peculiarities of the filaria observed in sections of the hardened tissues, there is no reason to doubt its identity with that which has been found associated with the same lesion.

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[1] Loc. cit., 1898, vol. i. p. 1011.

[2] Loc. cit., 1899, vol. i. p. 1459.

[3] See von Linstow, Centralbl. f. Bakt., 1892, vol. xii. p. 88.

A very large proportion of those who harbor hæmatozoal filariæ are apparently in perfect health. Under what conditions the worm becomes harmful to its host is not understood. The embryos discharged by the female into the lymphatic vessels reach the blood presumably through the right or left thoracic duct, and, it appears, circulate freely without apparently producing any harmful effects. The various associated lesions have been referred to the presence of the adult worm in the lymphatics. Few autopsies have been performed on the subjects of filarial disease, and the pathology of chyluria, chylous hydrocele, ascites, and various forms of lymphatic varix, of the scrotum, of the groin, and of the axilla is not fully explained.

A case of filarial hæmatochyluria was carefully studied during life by Stephen Mackenzie,[1] and at autopsy there was found an enormous lymphatic varix, very closely resembling that of the above described case. A mass of dilated lymphatic sinuses, occupying the entire space between the kidneys, extended from the diaphragm to the bifurcation of the aorta, and was continuous below with lymphatic tissue lying upon the iliac arteries. The thoracic duct formed by the union of several dilated pouched channels arising from this mass was distended, and at a point one and a half inches above the diaphragm was filled by a loose clot. The terminal part of the duct appeared to be pervious. Finding the lymphatics near the kidney greatly dilated, Mackenzie thought it probable that within the kidney between the lymphatic and urinary apparatus there was a communication by which chylous lymph entered the urine. The bladder appeared to be normal. Chyle and blood had, however, entirely disappeared from the urine three months before death.

Much more decisive is a case reported by Havelburg.[2] The patient had for six months suffered with chyluria, and filariæ had been found in the urine and at night in the blood. A partial autopsy disclosed an immense abdominal tumor extending from the kidneys to the pelvis and composed of varicose projecting sinuses containing chyle. The tumor was in intimate contact with the left side of the bladder. On opening this organ there was found in the mucosa opposite a perforation from which milky fluid could be squeezed.

[1] Loc. cit.

[2] Virchow's Archiv, 1888, vol. lxxxix. p. 365.

Extensive lymphatic varices similar to those already cited are described by Manson,[1] Ewald,[2] and Young.[3] In Manson's case the terminal two or three inches of the thoracic duct were entirely occluded, but below this level the lumen was patent, though occupied by a firm thrombus. The patient of Young suffered with a lymphatic varix of the scrotum upon which two successful operations were performed. Projecting tumors of a similar nature were present in both groins. At autopsy a huge mass of dilated varicose lymphatics was found in front and on either side of the lumbar vertebræ, and extended into the pelvis behind the bladder. Prolongations extended into the scrotum and projected in the groins. The thoracic duct was greatly dilated, and, as Young believed, occluded only at its orifice. Filariæ had been repeatedly found during the night, and three adult filariæ were obtained from the varix of the left groin, while seven were present in the lymphatics of the right spermatic cord. The case resembles very closely that described in the present paper.

In the cases cited, lymphatic vessels within the abdomen in front of the vertebral column have been transformed into an immense varicose tumor. The thoracic duct continuous with this tumor mass has been greatly dilated, and in several instances its terminal part has been occluded. The presence of this lymphatic varix, from which extensions lie in contact with the wall of the bladder and pass through the inguinal canal into the scrotum and under Poupart's ligament into the groin, explains the clinical manifestations of filarial infection. The inguinal masses, Manson's so-called "varicose groin glands," formed part of an extensive varix and may readily be mistaken for femoral herniæ. A similar extension into the scrotum, associated perhaps with rupture of the thinned and dilated lymphatics into the tunica vaginalis, gives rise to the condition known as nævoid elephantiasis of the scrotum, lymph scrotum, or chylocele. The case of Havelburg seems to show that chyluria may be the result of actual rupture of dilated lymphatic vessels into the bladder.

Recorded cases of filarial varix do not afford a satisfactory explanation of its pathogenesis. Mackenzie, Manson, and Young regard occlusion of the thoracic duct as an essential factor in its production. Manson suggests that this may occur as the result of mechanical plugging by a bunch of intertwined parent filariæ, or, as a consequence of inflammatory changes, produced by the presence of filariæ in the lymphatic vessels. This explanation does not accord with a number of observed facts. Ligation of the thoracic duct in animals is not followed by the formation of lymphatic varices. In cases reported by

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[1] Davidson's Hygiene and Diseases of Warm Climates, p. 814.

[2] Deutsch. klin. Wochenschr., 1888, p. 624.

[3] British Medical Journal, 1897, vol. i. p. 1037.

Martin,[1] Renvers,[2] and Ormered[3] the thoracic duct was occluded by thrombosis or by thrombosis and partial obliteration of the left innominate and subclavian veins. There were chylous ascites and moderate dilatation of the abdominal lymphatics, but nothing resembling the filarial varices described. On the other hand, in the cases described by Bryk[4] an extensive varicose condition of the abdominal lymphatics and of the lymphatics of the arms and legs as well was caused by a small tumor in the posterior mediastinum pressing upon the thoracic duct, but the condition did not resemble that which has been associated with filaria.

What part the right thoracic duct takes in the establishment of collateral circulation has not been shown. No dilatation of this channel has been noted in any of the cases mentioned.

A condition which has received little attention is well illustrated in the present case. The lymphatic vessels throughout the varix are filled not with lymph but with blood. The case of Mackenzie was one of hæmatochyluria. In Ewald's case the dilated lymphatics contained bluish-red clots. The suggestion of Manson that red blood-corpuscles are formed within the obstructed lymphatics is not supported by any evidence. The presence of blood within the dilated vessels suggests a regurgitation at some point of communication between the venous and lymphatic systems. Should the presence of adult filariæ bring about some change by which either temporary or permanent regurgitation might occur, the production of extensive varicosity would resemble that which follows a fistulous communication between an artery and a vein. It is very improbable that artificial communications between the vascular and lymphatic systems are ever produced by filariæ. It is not inconceivable, however, that the presence of the adult parasite might produce alterations of the valves at the orifice of the thoracic duct. The formation of a varix and the presence of blood throughout it are not explained by mere occlusion of the duct. The facts at our disposal do not furnish an adequate explanation of these conditions.

Repeated febrile attacks often associated with evident lymphangitis form an important clinical feature of filarial varix and its various manifestations. In the present case a fatal termination followed acute fibrino-purulent peritonitis and pleurisy, and the entire varix was the seat of acute lymphangitis. The left pleural cavity, which unlike the right was not in immediate contact with the varicose thoracic duct, escaped. Both tunicæ vaginales were the seat of fibrino-purulent inflammation resembling that of the peritoneum and pleura. Bacteriological examination demonstrated the presence of diplococcus lanceolatus within the varix and upon the inflamed serous surfaces. The mass of dilated lymphatics not improbably represents a point of least resistance and exposes the infected individual to the constant danger of secondary bacterial invasion. The suggestion of Manson that death of the parent worm is a source of inflammation seems improbable.

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[1] Cited by Dawson, Obstruction of the Thoracic Duct or its Venous Outlet. Twentieth Century Practice of Medicine, New York, 1895, vol. iv. p. 645.

[2] Loc. cit.

[3] Loc. cit.

[4] Loc. cit.

The constant presence of a peculiar species of parasite and its relation to the associated lesion leave little doubt concerning the etiology of lymphatic varices and the accompanying conditions already considered. The relationship of filaria to the wide-spread tropical disease, endemic elephantiasis or elephantiasis Arabum, maintained by Manson and other writers, has not been so clearly established. In this disease repeated attacks of fever accompanying localized inflammatory œdema are followed by a progressive hypertrophy of the cutaneous and subcutaneous fibrous tissue and in less degree of the intermuscular areolar septa. The new-formed tissue is dense and fibrous and contains numerous distended lymphatic vessels. Some writers, for example Hebra,[1] in his monograph on elephantiasis, do not distinguish between true elephantiasis and hypertrophies due to the presence of lymphatic varices. So-called nævoid elephantiasis or lymphatic varix of the scrotum is, for reasons already discussed, doubtless caused by Filaria bancrofti. Manson summarizes as follows the facts which he believes show a causal relationship of the same parasite to true elephantiasis: (1) The geographical distribution of Filaria nocturna and elephantiasis Arabum correspond. (2) Filarial varix and elephantiasis frequently coexist in the same district and, indeed, in the same individual. (3) Lymphatic varix of the scrotum often terminates in elephantiasis, while (4) elephantiasis of the leg has been observed to follow removal of a scrotal varix. (5) Both lymphatic varix, which is undoubtedly caused by Filaria bancrofti (Filaria nocturna), and elephantiasis are diseases of the lymphatics and (6) are accompanied by the same type of recurrent lymphangitis.

Nevertheless, embryo filariæ are not necessarily found in the blood of those suffering with elephantiasis, and, indeed, Manson states, are less frequently present in the blood of such individuals than in unaffected natives of the same district. Manson has advanced the hypothesis that the lymphatics of the part are plugged by ova which have escaped from the parent worm before their complete development into slender worm-like embryos. This suggestion of filarial abortion, as he designates the process, is not supported by any direct evidence. He recognizes the fact that simple plugging of lymphatics is not sufficient to produce inflammatory hypertrophy of fibrous tissue, but thinks that recurring erysipelatoid inflammation in the congested area is an essential factor in the production of the disease.

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[1] Wiener Klinik, 1885, vol. xi. p. 217.

Manson has suggested that the papular and pustular disease of the skin known as craw-craw occurring on the west coast of Africa is caused by the parasite which he designates Filaria sanguinis hominis perstans. Though O'Neil, who first described the condition, found a filaria-like worm in the pustules, the parasite has never been identified with any since discovered.

Manson found his Filaria sanguinis hominis perstans in three cases of "sleeping sickness" from the Congo, and suggested an etiological relationship. As he points out, the prevalence of filarial infection in the locality makes an accidental association of the two conditions not improbable in these cases. Filariæ doubtless cause various forms of lymphatic varix, chyluria, and chylous hydrocele, but their further pathological significance has not been established.

GRANULAR DEGENERATION OF THE ERYTHROCYTE.[1]

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(From the William Pepper Laboratory of Clinical Medicine, Phebe A. Hearst Foundation.)

Granular, basic, or punctate degeneration of the erythrocyte is a condition in which this cell presents fine or coarse granules that have an affinity for basic stains. This degeneration affects cells which show other evidences of pathological change, as poikilocytosis and polychromatophilia, or may be present in a cell which in all other appearances is normal. Further, it may be seen in nucleated erythrocytes, where it shows absolutely no relation to the nucleus. In size the granules may be so small that they can scarcely be seen, or so large as to be nearly the size of the eosinophile granule. The shape is usually rounded, though pear-shaped, and, exceptionally, rod forms are encountered. Cells may show one or the other sized granules, or a mixture of both. The granules are usually equally distributed throughout, or small clumps may be seen in different parts of the cell. This latter arrangement is especially marked in the early stages of experimental

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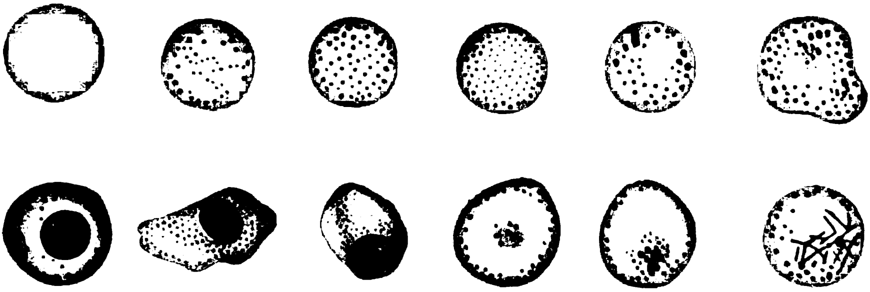
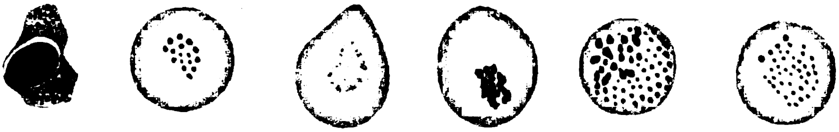
[1] Read by Dr. Alfred Stengel at the Sixteenth Annual Meeting of the Association of American Physicians, held at Washington, D. C., April 30 to May 2, 1901.

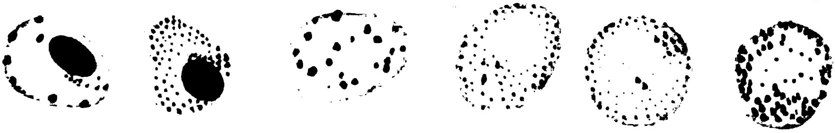
Lead Workers.



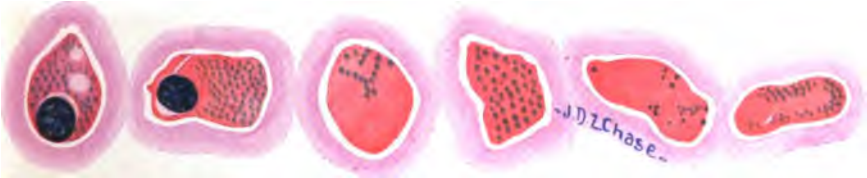
Dog's Blood.



Lead Poisoning.



Bone Marrow.



STAINS.—Nos. I., II., and IV., Eosin and Hæmatoxylin. No. III., Thionin Phenique.

productions and is rare in blood from the human subject. There may be a few large or fine granules scattered in the cell, or countless numbers densely packing the cell and to a great extent obscuring the intergranular substance.

It is impossible to detect this form of degeneration either in the fresh blood or in dried and unstained mounts.

Attention has been called to these granules as a special form of degeneration only in the past few years. Their presence in the circulating peripheral blood had been undoubtedly observed for a much longer period. The earlier writers, Geelmyden, Hausemann, V. Noorden, Loos, Askanazy, Shuman, Lazarus, Klein, Zenomi, and Lenoble observed such granules; and lately Litten, Krause, Bouchart, and Grawitz (in his first publications) called attention to cells with minute basic granules, which they thought were products of fragmentation (karyorrhexis) of the erythroblast, and, indeed, this view has not been wholly abandoned at the present date. Others have confounded them with polychromatophilic changes, and Plehn considered them related to malaria.

Grawitz, in his paper of September, 1899, was the first to lay particular stress on this granulated cell as an evidence of a special form of degeneration, and he opposed the earlier view of fragmentation or persistence of remnants of the nucleus, and pointed out that in his observations these cells were found in blood in which there was no other evidence of cellular change, and in which there were no nucleated erythrocytes; and, further, that when nucleated cells were present there were no transitional stages. Later, he demonstrated that this degeneration could be seen in nucleated cells while the nucleus was intact. In further studying the cells of the blood-forming organs he was unable to find this change in the newly-formed cells or in the erythroblasts, and, therefore, came to the conclusion that this degeneration was probably of peripheral origin, and he suggested that it was possibly due to the direct action of some blood poison. Litten substantiated this view in the study of the bone-marrow in cases of severe anæmias, where he found much evidence of erythrocytic degeneration, but was unable to find evidence of this special granulation. On the other hand, both Pappenheim and C. S. Engel have seen similar granules in embryonal blood. Hamel and Behrendt were the first to demonstrate the frequency of this cellular change in the peripheral blood of patients poisoned by lead. These observations gave Grawitz support for his former theories regarding their origin, and led him to study the blood under experimental intoxications with this metal. Experimentally he was able to observe these granulated cells in the blood of mice at a very early stage of the intoxication, and even when these animals had been subjected to the minute dose of 0.03 gramme of the acetate of lead for a very short time. Moritz repeated similar experiments, using rabbits, and clearly demonstrated to his own mind that these granulations are an evidence of a true degeneration and not artefacts.

Sabrazès, Bourret, and Léger claim to have first produced these granules experimentally in animals, using guinea-pigs and injecting small doses intraperitoneally.

Grawitz, working upon a theory suggested by Plehn's observation of similar granulations in the blood of Europeans coming to the tropics, thought that the change of temperature had something to do with their formation. Following this idea, he was able to demonstrate the presence of these granules in mice subjected to increasing daily temperatures.

Schur and Loewy, in an extensive study of the bone-marrow in various diseased conditions, were unable to find such granulations. They came rather hastily to the conclusion, therefore, that this cellular condition was of artificial production.

From the foregoing observations and experimental studies it seems to us without a doubt that these granular formations, be they the remains of fragmentation of a previously existing nucleus or a special production, are an evidence of a pathological change when found in the circulation. With this in mind we have undertaken the study of this granular degeneration in lead workers and experimentally in its relations to lead intoxications. Our studies have included:

1. Cases of chronic lead-poisoning.
2. Studies in lead workers with no subjective symptoms.
3. Heat cases—heat workers and local therapeutical heat applications.
4. Results of experiments.

1. *The Cases of Chronic Lead Intoxication.* In all the cases so far reported by Hamel, Behrendt, Grawitz, Moritz, etc., in which the granules have been sought they have invariably been found. This granular formation seems to be a very early evidence of lead intoxication; in fact, as will be seen later, appearing before all other symptoms, considered subjectively or objectively. The number of granular cells appears to be in direct proportion to the severity of the poisoning, and their disappearance is noted as the symptoms ameliorate.

Four of our cases were hospital cases, the men coming under observation with marked and typical symptoms of chronic poisoning. The granules were present in all four cases in varying numbers up to nine in one field (of a very thin spread and $\frac{1}{12}$ oil immersion). The granules varied in size, some cells showing very fine and others very coarse granules, and others a mixture of both. It might be said that in the severest cases the coarser granules are slightly in excess.

The blood otherwise showed only very slight changes from normal, namely, a slight paleness of the erythrocytes, and a slight poikilocytosis, especially marked in irregularity of size. A very few nucleated erythrocytes were seen. These were normoblasts, and the majority of them showed the granular degeneration of their protoplasm while the nuclei were intact as far as could be detected.

2. *Lead Workers Without Subjective Symptoms.* Grawitz and Moritz each had five cases which could be included under this head, and in which they found granules. Examining twenty-one lead workers without subjective symptoms we found the granules present in every case. The spreads of blood were taken at the workshop while the men were actually engaged at their various duties. The nature of the work of these men included that of foreman of the works, " sprinklers " who watered the dust, and laborers, some handling the metallic lead, others the oxide, others the " wet pulp." These men were more or less exposed to the dust of lead during their working hours.

The list includes two who had worked only four days, the shortest exposure, and one man who had been constantly working in the metal for twenty-four years, the longest exposure. Only one of the twenty-one men, an oxide worker, had presented symptoms. This one had had several distinct attacks of chronic lead-poisoning in ten years of actual contact with the metal. One other, who had been working only three months, and who showed the greatest number of granules in the stained spread, had had about one month previous to observation an indefinite illness which had detained him one week from his work. The number of these granulated cells varied from a few in a spread to as many as two or three in a field of the microscope. The other evidences of blood changes were only slight and rather inconstant as to any particular form of variation. Twelve cases showed slight poikilocytosis, but more particularly irregularity in size of the corpuscles. Two at least certainly had deficient hæmoglobin (noted by the lack of stain taken by the cell). Three showed only a slight polychromatophilia, and in five cases normoblasts were observed, most of these latter cells showing granules in their protoplasm while the nucleus was unchanged. (See table at end of article.)

3. *Heat Cases.* The studies we made in this line were suggested by Grawitz's experiments with mice and by Plehn's observation on Europeans coming to the tropics, and by a case of an iron worker in whose blood we had found granulated cells in large numbers. They consisted in studying the blood of four iron workers who were subjected to intense heat while at their work at furnaces, and that of patients using local dry hot air treatment. In these latter cases, of which there were four, the various parts of the body, especially the limbs, were subjected to a temperature of 300° F. In the former as well as in the latter cases we were unable to find a single granulated cell in the spreads made from the peripheral circulation.

In the case above mentioned we were led to conclude that the granules were the result of the chronic diarrhœa which had existed for twenty years, or were possibly due to lead which he not unlikely received during a prolonged course of treatment. Here we might include five cases which had been subjected to applications of lead-water and laudanum. In two of these cases the application had been made to denuded areas, while in the remaining three to the unbroken skin. Daily observations were made in these cases for a week or ten days, but in them we were unable to find any evidence of granular degeneration.

4. *The Experimental Study.* These granules have been produced in mice by Grawitz, in rabbits by Moritz, and also in guinea-pigs and pigeons by Sabrazès, Bourret, and Léger.

In our own cases dogs were used, and the lead acetate was administered by mouth in capsules with the food. The initial dose was always a gramme, irrespective of the animal's weight. In two dogs one gramme was given daily throughout the observation; in three the initial dose of one gramme was increased by one gramme each day until the experiment was concluded. The blood in all these cases was carefully studied for several days previous to the experiment, and then every twenty-four hours for a few days after the intoxication had begun, and then at longer intervals. Spreads were made from the carefully shaven and cleaned ear, dried for twenty-four hours, and then fixed by heat, and studied under various stains.

Distinct granules appeared after the initial dose, usually in about three days, irrespective of the size of the dose compared to the animal's weight, or to the manner of increase of the same, though indistinct granules were noted after twenty-four hours. In the three cases in which the dose was rapidly increased the granules became more numerous in a shorter time than when the gramme dose was given daily. In all of these cases the early granules showed a greater tendency to cling together than they did later. This clinging together or clumping of the granules in different parts of the cell was more or less characteristic in these experimental productions. It was usually absent in the cases of lead-poisoning or of the lead workers. On the other hand, the even distribution so commonly seen in the lead workers was not observed at any stage of the experimentally produced poisonings. In the dogs it was a common observation to find associated with these granulated cells erythroblasts and polychromatophilia. The finding of these latter types of blood degeneration does not seem to us to be of such significance as when they are found in the human subject. They are a rather frequent finding in dogs which are used for experimental purposes. The appearance of granular degeneration in the peripheral blood, twenty-five hours after one of the writers had taken seven and one-half grains of lead acetate, shows conclusively the early production of this change in human blood.

The fact that these granules were not found in the bone-marrow by the various observers led us to believe with Grawitz that they were of peripheral origin, or that the usual methods for fixing the bone-marrow were inadequate for their demonstration. To determine the former view blood was taken from various veins of the body, stomach, mesentery, liver, portal vein, spleen, and heart in animals killed for this study, and compared with the blood taken ante-mortem from the ear. The results of these observations were as follows: The blood taken from the portal vein and splenic vein showed a greater number of these granules than did the blood of the ear, heart, or mesenteric vessels. This was but an isolated observation, and we hesitate to draw any definite conclusions. In five later cases this unequal distribution was not sufficiently marked to prove the peripheral origin of these granules.

For the study of the bone-marrow two methods were used. The bone was sectioned in pieces, three-quarters of an inch long, and the marrow was taken from its bony case by running an ordinary sewing needle around it, then, when it was freed from the bone, carefully pushing it out. In this way the marrow was obtained intact. Spreads were made from this marrow by the usual methods for making blood smears. Some of these spreads were fixed immediately in ether and absolute alcohol; absolute alcohol; 10 per cent. formol; saturated aqueous solution of bichloride of mercury; 1 per cent. osmic acid; saturated solution of picric acid in absolute alcohol; others were dried and fixed with heat alone, or previously to heating treated with ether to remove the fat. Further, this shelled-out bone-marrow was fixed by the usual methods and sections made from paraffin blocks. From the former spread specimens, variously fixed, we were able to demonstrate the granular changes in the erythrocytes and the erythroblasts, but in no bone-marrow spread was the number of these granules in greater number than we found in the peripheral circulation. These cells may have been in the circulation of the bone-marrow. The fixing agents from which the best results were obtained were ether and absolute alcohol, absolute alcohol, and bichloride solution. From the great amount of fat which is always present in these spreads, and which interferes to a great extent with fixing the specimens by the usual heat method, it was thought that it might interfere with the staining of these granules. To ascertain the rôle which fat played in this way spreads from the ear blood were kept at 52° C. for twenty-four hours on fat taken from the mesentery of a dog. They were then fixed by heat and stained in the usual way. While the granules could be found after the spreads were so treated there seemed a decrease in their number, especially so in the case of the finer granules.

From the bone-marrow fixed in the various methods and mounted in paraffin sections were cut at 2μ. In these sections fixed by various agents—alcohol and ether; absolute alcohol; osmic acid, 1 per cent.; formol, 10 per cent.; Müller-formol; Zenker's solution; Flemming's fluid —we were unable to demonstrate the presence of granules.

In our routine study of these granulated cells all the blood spreads have been fixed by heat on a copper plate. The specimens heated for a few minutes only seem to be better prepared for staining than those heated for a longer time. The stains used for this work have been the usual hæmatoxylin and eosin stains and thionin phéniqué. In using the former stains the specimens should be overstained with hæmatoxylin; with the latter the granulated cells stain rapidly and are very easily detected.

With aqueous solutions of the following stains we have been able to detect these granules in specimens fixed by heat: basic fuchsin, carbol-thionin, aniline green, gentian violet, Bismarck brown, tuloidin-blue, dahlia, methylene-blue; also Löffler's methylene-blue, hæmatoxylin, hæmalaum. We have been unable to find them when we used aqueous solutions of aniline blue, Berlin blue, Jod. green, indulin, tropæolin, blue-black, methylene-green, orange G., acid fuchsin, rosin, Ehrlich triacid, nile blue, benzopurpin. For routine work we recommend the use of the usual hæmatoxylin and eosin stains, or, which is especially good for the study of these granules, the thionin phéniqué, the formula of which is:

Thionin (French)	0.05
Carbolic acid	1.00
Alcohol 95 per cent.	10.00
Aq. destil.	90.00

The stain becomes better with age.

Our conclusions are:

1. The granules are a constant finding in cases of lead-poisoning, and appear very early in cases under the influence of lead salts long before subjective or other objective symptoms can be demonstrated.
2. The granules disappear in cases of chronic lead-poisoning as the convalescence is established.
3. Apparently lead does not produce an immunity, as one of the cases worked for twenty-four years, another for twenty years, without having pronounced symptoms of lead-poisoning, and in both of these cases the granules were present in moderate numbers.
4. The granules may be produced experimentally in dogs, appearing in a very few days after the beginning of the experiment, and increasing as the intoxication becomes severe.
5. The granules in the experimental cases are rather fine, and show a tendency to clump at first; later all varieties appear.
6. We believe these granules to be a true degeneration of the erythrocyte and having no relation to nuclear fragmentation or to polychromatophilia.

LEAD WORKERS.

Case No.	Time worked in lead.	Degree of exposure.	Poikilocytosis.	Hæmoglobin estimated by the amount of stain per cell.	Nucleated erythrocytes.	Granular degeneration.	Estimated average number of granular cells to a field ($^1/_{12}$ oil immersion).
1	7 years	Considerable.	Slight.	Normal.	Present (one in slide).	Present.	One to two cells to a field.
2	5 "	Moderate.	"	"	Absent.	"	One cell to every two or three fields
3	3½ "	Considerable.	"	"	Present (few).	"	One cell to every four or five fields.
4	24 "	Constant.	"	"	Absent.	"	One cell to every three or four fields.
5	7 "	Considerable; poisoning 5 yrs. ago.	Absent.	"	"	"	One cell to every ten or twelve fields.
6	9 "	Slight.	"	"	"	"	One cell to every ten or twelve fields.
7	11 "	Considerable.	Slight.	Reduced.	"	"	One cell to every ten or twelve fields.
8	9 "	"	Absent.	Normal.	"	"	One cell to every seven or eight fields.
9	7 "	"	"	"	"	"	One cell to every four or five fields.
10	2 wks	"	"	"	"	"	One cell to every six or seven fields.
11	6 "	Constant.	Slight.	Reduced, and polychromatophilia.	Present (many).	"	One cell to every six or seven fields.
12	8 mos.	"	"	"	Present (few).	"	One cell to every six or seven fields.
13	3 "	"	"	"	Present (many).	"	Two to three cells to every field.
14	4 days.	"	Absent.	Normal.	Absent.	"	One cell to every four or five fields.
15	4 "	"	"	"	"	"	One cell to every four or five fields.
16	5 years	Considerable.	Slight.	"	"	"	One cell to every field.
17	1 year	"	Absent.	"	"	"	One cell to every four or five fields.
18	2 wks.	"	"	"	"	"	One cell to every two or three fields.
19	4 "	Constant.	Slight.	"	"	"	One cell to every three or four fields.
20	20 years	Considerable.	Absent.	Reduced.	"	"	One cell to each field.
21	10 "	"	Slight.	Normal.	"	"	One cell to every three or four fields.

REPORT OF AN INTERESTING CASE OF ANEURISM OF THE INTERNAL CAROTID ARTERY.[1]

BY WALTER B. JOHNSON, M.D.,
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THE case of dissecting aneurism of the internal carotid artery here presented is of interest, not only in consequence of its rarity and the peculiarity of the point of exit of the first hemorrhage, but also because of the diversity of opinion which existed among various competent observers regarding the etiology.

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[1] Read at the Seventh Annual Meeting of the American Laryngological, Rhinological, and Otological Society, 1901.

J. R., male, aged four years, born of Italian parents, was first visited March 15, 1900, in consultation with Drs. John H. Banta and M. Alexander Mackintosh, of Paterson, N. J.

The family history disclosed no specific tubercular or malignant disease except in the case of the maternal grandfather, who had been operated on for malignant disease of the tongue.

Previous History. The child has generally enjoyed good health; the left ear has discharged pus for over a year since the patient had an acute suppurative otitis. Ten days before the present date Dr. Banta first attended the patient, who at that time had an acute inflammation of the throat. There was a swelling in the left tonsillar region which was accompanied by fever, nausea, pain, and the general physical symptoms attendant upon peritonsillar inflammation.

On March 14th, in the afternoon, possible traumatism may have resulted, as an Italian woman, a midwife, called and, the father states, undertook to relieve the child by rupturing the tumor with the finger-nail. A little blood, and he thinks some matter, was discharged.

On the evening of the same day Dr. Banta was hastily summoned, as the child was bleeding from the ear; a very considerable hemorrhage occurred, lasting about fifteen minutes.

15th. An incision of the swollen mass in the tonsillar region was considered advisable, and preparation for the operation was made. The child was obstreperous while the physician was making a preliminary examination, and forcibly depressing the tongue a sudden gush of blood occurred from the left ear. The hemorrhage was very profuse and continued for over fifteen minutes, saturating six large towels. The writer was then called in consultation. *Examination.* The patient was pale and cold; skin dry, the pulse rapid and feeble, the expression anxious, and there was marked general depression. A blood-clot in the left auditory canal was removed. The inferior wall of the canal was apparently pushed upward in such a manner that no portion of the tympanum could be seen. There was a pulsation in the fluid on the line of coaptation of the canal walls. There was a tense, somewhat triangular swelling below the ear, about the size of an egg, which seemed to be limited by the fascia of the neck; no pulsation could be felt in any part of the growth, nor could any aneurismal bruit be heard.

Internally in the left tonsillar region there was a large tumor, dusky red in color, tense, and not easily compressible, which did not pulsate at any point. It involved the whole left peritonsillar region; extended downward toward the larynx and upward into the post-pharynx behind the left pillar of the fauces, and its most prominent portion pressed toward the right tonsil past the median line. Upon the anterior aspect of the tumor there was what appeared to be a dark-colored abrasion, about one-half inch in length, which was probably made by the finger-nail or by some instrument used on the preceding day by the Italian midwife. There was no hemorrhage from this point at the time of the examination. The tumor was diagnosed a "dissecting aneurism," and was thought to be due to possible ulceration of a bloodvessel from previous tonsillar disease or to traumatic injury at the hands of the Italian woman. Incision was opposed.

20th. Another considerable hemorrhage occurred from the left ear, and on the next day and for several successive days there was a constant discharge of bloody serum from the ear.

31st. The child was carefully examined. The swelling of the auditory canal had decreased; at the junction of the skin of the auditory canal and the tympanum were two points from which there was a discharge of a rather thick serous fluid; the tympanic membrane had a large perforation involving about one-third of its area. The tumor mass was much decreased in size externally and internally. The patient did not return for further treatment, having employed Dr. Vigna, an Italian physician.

June 11th. The patient was again referred to me on the advice of Dr. John C. McCoy, whom the attendant had called in consultation, as he wished to incise the tumor; incision was considered inadvisable. The patient was suffering from dyspnœa, and seemed drowsy and stupid. The tumor was increased very much in size. The doctor reported that the child had been fairly well until three days prior to present visit, when, during an attack of enteritis and fever, the tumor suddenly increased. A hemorrhage had probably occurred which dissected downward and encroached upon the laryngeal space.

The patient was referred to Dr. C. C. Rice for an opinion, which was in part as follows:

"I cannot at this date be positive as to the character of the tonsillar swelling, as to whether it is malignant or tubercular," and on a later date: "It looks as though the tonsillar growth is malignant. I hope you will have a tracheotomy done immediately."

The case was referred to in a discussion at a meeting of the Section on Ophthalmology and Otology, New York Academy of Medicine. An expression of opinion was asked regarding the probability of the aural hemorrhage resulting from an aneurism. Dr. H. Knapp at that time asserted that he believed it possible for a dissecting aneurism to burrow upward beneath the fascia of the neck and along the floor of the bony auditory canal, and for the blood to make its exit at the junction of the skin and tympanic membrane. Some of the members of the section seemed to lean toward the probability of a hemorrhagic otitis being the cause of the aural hemorrhage, inasmuch as the otitic inflammation was present as a complicating factor.

The case was examined by a number of surgeons, and the general opinion was that the tumor mass, which did not pulsate at any point, was not easily compressible, and over which no aneurismal bruit could be heard, should not be considered an aneurism.

13th. The child was sent to the Paterson General Hospital, etherized, and a tracheotomy made by the writer. The tonsil which was atrophied was dissected from the tumor mass and reserved for examination. The tumor walls were smooth and tense and dusky red. Two exploratory punctures were made in the tumor with an aspirating needle, one on the anterior surface and the other on the posterior. A small quantity of blackish semi-disorganized blood was withdrawn. The report on the tonsillar mass sent to Dr. Thomas S. Cullen, of Baltimore, for examination was that in the atrophic tonsillar tissue "there is no evidence whatever of carcinoma, nor is there any suspicion of tuberculosis."

14th. The patient was resting comfortably, breathing nicely through the tracheal canula; stupidity and drowsiness disappeared. There was slight paralysis affecting the left eye. The pupil was moderately dilated.

25th. The tumor has decreased in size nearly one-half; the child breathes comfortably with tracheal canula corked; his general appearance is markedly improved; his appetite is very good, and the cachectic, waxy look has nearly passed away.

July 12th. The patient has steadily improved, is about the wards and looks very well. He is still wearing the tracheal tube. The left pupil is slightly dilated; the tumor mass much decreased in size; parents took him home for a short visit.

14th. Patient returned with a severe attack of bronchitis; coughed and expectorated through the tube large quantities of muco-pus.

29th. Patient had a second bronchial attack, after which there was a discharge of ichorous bad-smelling pus.

September 7th. Since last date, after recovery from bronchitis, the patient did well. The tumor gradually decreased in size, and it seemed possible that spontaneous cure would be effected. At 9.30 P.M. on this date the tumor mass suddenly increased in size; the child had a profuse hemorrhage from the nose lasting a few minutes. It subsided gradually, and the child slept quietly for about two hours, when he awoke coughing and bleeding from the mouth and both nostrils. In a very few minutes the bedding and mattress were saturated with blood, and large blood-clots formed beneath the edges of his pillow. The child lost considerably more than a quart of blood. When seen after this hemorrhage the patient was profoundly shocked, pale, cold, and apparently exsanguinated. He was restless and thirsty. His temperature was 99°, his pulse 160, and his respiration 36.

8th. The patient's condition was such that operation for ligation of the common carotid artery was not considered advisable. At 12.45 P.M. on the same day there was another very considerable hemorrhage.

10th. The patient died of exhaustion, no further hemorrhage having followed. Although no autopsy was permitted, there can be no question regarding the cause of death.

HYDATID DISEASE OF THE BREAST.*

By Robert G. Le Conte, M.D.,
OF PHILADELPHIA.

Scarcely an organ or any portion of the body seems to be exempt from hydatid disease, but one of the organs least frequently attacked is the breast. Owing to its extreme rarity, and perhaps also to the benign course which the disease runs in an organ so superficially situated, our text-books and systems of surgery touch but lightly on hydatid disease of the breast, and the subject, if referred to at all, is usually dismissed in a few lines. It therefore seems proper to place the following case on record, as it is apparently the first one to be observed in America, and at the same time to review the literature of the subject, in order that the prominent symptoms of the disease may be brought out clearly. In none of the reported cases was the diagnosis positively made previous to operation unless a spontaneous opening of the cyst had taken place.

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* Read at a meeting of the College of Physicians of Philadelphia, May 1, 1901.

Edna B., a well-nourished mulatto, aged twenty-seven years, was admitted to the Pennsylvania Hospital on March 13, 1899. She was born in Philadelphia, and has spent the whole of her life in this city or in the neighboring one of Camden. No clear history of the diseases of childhood is obtainable. Menstruation began at the age of fourteen, and was normal and regular. At sixteen years she was married, and later was the mother of two children, the first born at eighteen years and the second fifteen months later. At twenty-one she had a miscarriage. Shortly after the birth of the first child she noticed an enlargement, with pain, of the right cervical glands near the angle of the jaw; this enlargement slowly spread down the neck without suppuration. A little more than four years ago the right axillary glands also became prominent, with slight pain. Shortly after the axillary enlargement, say four years ago, she noticed a tumor the size of a chestnut in the right breast about two inches above the nipple; this tumor was hard, painless, not adherent to the skin, and freely movable. It preserved these characteristics for two years, during which time it did not increase perceptibly in size, until one day she struck it with the handle of a shovel while working. Rapid enlargement then began, and it was at times quite painful, particularly after a hard day's work. The tumor continued firm and hard until one month previous to admission, when it seemed to decrease a little in size and become soft. The right cervical glands suppurated and were incised six weeks before admission. On admission, a round, slightly tender, fluctuating tumor, the size of a small cocoanut, occupied the position of the right breast. The skin was normal in appearance and movable over the tumor, except for about an inch surrounding the nipple, where it was adherent, œdematous, and slightly inflamed. The growth could easily be moved over the pectoral muscle. But little breast tissue could be made out surrounding the growth. A small mass of tender and enlarged glands were felt in the right axilla. In addition there was a suppurating sinus on the right side of the neck, which looked tuberculous.

We have the following facts on which to base a diagnosis: A hard, painless, freely movable tumor in a young multiparous mulatto woman, appearing two years after a miscarriage and five years after a chronic enlargement of the right cervical glands. The tumor remained quiescent until subjected to a trauma, when it undergoes rapid growth, but still retains its hardness. The cervical glands break down and suppurate, followed by a softening of the tumor, adhesion to the skin in the region of the nipple, and fluctuation. Three conditions were considered: (1) Adenoma, which had undergone cystic change; (2) tuberculous abscess, and (3) echinococcus cyst. The latter was immediately dismissed on account of its extreme rarity and also because I knew nothing of its clinical symptoms. As the cervical glands were so evidently the seat of tuberculous abscess, the possibility of the breast being the seat of a cold abscess was worthy of consideration. But this diagnosis was also dismissed on account of the long duration of the tumor (four years), its mode of growth, and the absence of sinus formation. A diagnosis was, therefore, made of adenocele or cystic adenoma, because adenoma is so common in young women, grows slowly and generally painlessly, causes atrophy of the gland from pressure, and sometimes attains large size, even to ten or twelve pounds in weight.

March 15th the patient was etherized and a curved incision made over the tumor to the outer side of the nipple. The sac immediately presented. In attempting to dissect this from the adhesions about the nipple the sac was ruptured and from twelve to fifteen ounces of pus escaped. Some of this fluid was immediately placed under a microscope and hydatid hooklets were found in large numbers. As scarcely any glandular tissue of the breast remained, the breast was amputated together with the enlarged axillary glands. The wound was readily closed with silkworm-gut sutures without drainage, and healed by primary union. The recovery was uneventful.

The pathological notes are kindly furnished by Dr. Simon Flexner:*

Wall of Cyst. The inner lining shows to the naked eye superficial convolutions which, on section of the cyst, present an appearance of polypoid excrescences. These are in immediate contact with the fibrous tissue in which there are islands of glandular tissue. Microscopically the excrescences described consist of a granulation tissue showing different degrees of density; the outward projections are lighter in texture than the intervening tissue where the cells are more compact. The character of the cells is largely epithelioid, but among these cells there are a certain number of the type of Unna's plasma cells. At the line of junction between the fibrous tissue and the granulations there is an almost unbroken layer of plasma cells. The inner surface shows an extensive hyaline transformation of the cells and the intercellular substance. Nothing that can be recognized as such remains of the cuticular membrane. In the forty or fifty sections examined hooklets were not discovered. In the adjacent mammary tissue there is an overgrowth of fibrous tissue.

Axillary Lymph Gland. Sections of a moderately enlarged lymph gland show (first) moderate hyperplasia of the lymph cords and (second) extensive hyaline degeneration of the cords and nodes. This latter degeneration affects the interstitial tissue, where it gradually obliterates the lymph cells proper. It also occurs in the walls of the medium-sized bloodvessels. It presents many of the appearances of amyloid degeneration, but it corresponds accurately with Recklinghausen's hyaline degeneration of lymphatic glands. There are no tubercles in the sections.

It is very difficult to get an estimate from the literature of the frequency of hydatid cyst compared with other tumors of the breast, or the frequency with which the breast is attacked in hydatid disease.

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* The specimen was two years old when given to Dr. Flexner. The alcohol in which it was preserved had been repeatedly changed.

The eminent writers of the eighteenth and the first third of the nineteenth century classified most of the cystic diseases of the breast under the term of hydatid. Thus, Sir Astley Cooper, in his *Illustrations of Diseases of the Breast* (London, 1829), divides hydatid disease into four separate varieties, and in but one of these divisions does he speak of a parasitic origin. The report of such cases as true hydatids must, therefore, be looked upon with suspicion, unless some positive finding, as daughter cysts, scolices, or hooklets are recorded with the case. After a fairly careful search of the literature I have collected thirty-three cases in which the diagnosis of hydatid disease seems assured. In addition I append some cases where the echinococcus may have been present, but the history does not permit of an exact diagnosis. Of these thirty-three cases the histories are sufficiently clear in twenty-seven to draw some definite conclusions. I have arranged them in the form of a table under headings which seem characteristic of the disease.

Such cases as reported by Warren (*Surgical Observations on Tumors*, London, 1839, p. 205), Roux (*Notizen aus dem Gebiete der Natur- und Heilkunde*, 1828, Bd. xx., p. 351), Fréteau (*Journ. Général de Méd.*, Paris, 1828, p. 145), Sir Astley Cooper (*Illustrations of Diseases of the Breast*, London, 1829, Part I., pp. 49 and 50) are not placed in the table, because there is nothing in the history which shows them positively to be hydatids, although they have been so considered by other writers. The following cases were also omitted because the glandular tissue of the breast was not involved, the hydatid having its origin in the pectoral or serrate muscle, or within the cavity of the chest, although the tumor presented in the mammary region: Marmaduke Shield (*Diseases of the Breast*, London, 1898, p. 254) two cases, Gräfe and Walther (*Journ. de Chir. und Augen-Heilkunde*, 1827, Bd. x., Heft 3, p. 375), von Lesser (*Deutsch. med. Wochen.*, January 7, 1881, p. 7), Landau (*Arch. de Gynécologie*, 1875, t. viii., p. 350), Schnepp (*Rev. Centralb. f. Chir.*, May 13, 1876, p. 304), Gerdy (*Bull. de l'Acad. de Méd.*, 1844, t. x., p. 517), Gardner (*Lancet*, June 8, 1878, p. 851), etc. Many of these cases have been quoted as instances of hydatid disease of the breast. Guermonprez's (*Rev. Méd. Franc et Etrang*, Paris, 1884, p. 73) case, while quoted as a hydatid, was in reality a form of cysticercus. Dupuytren's case has been placed in the table, although the record does not clearly state the situation of the growth, whether in the breast or the pectoral muscle.

Recorder and reference number.	Marri'd or single.	Previous births.	Tumor.							Axillary enlargement.	Operation.	Remarks.
			First noticed	Duration.	Position.	Characteristics of growth.	Size.	Pain.	Contents.			
1. Bansi[1]	Single	None.	21 yrs.	2 yrs.	Left breast, lower inner quadrant.	Slow.	Egg.	For last few months	Clear fluid, one cyst.	None.	Incision and drainage.	Recovery 31 days: diagnosed as fibro-adenoma.
2. Bérard[2]	Marri'd	....	....	....	Right breast, lower half.	Slow.	Twice as large as left breast.	Always present	Clear fluid, one cyst.	None.	Spontaneous opening.	Recovery 25 days; appeared 8 months after a blow on breast.
3. Bermond[3]	Marri'd	Preceding tumor.	26 yrs.	8 yrs.	Right breast.	Slow.	Apple.	None.	Clear fluid, one cyst.	None.	Punctured; later incision and seton	Recovery 3 months; had 6 labors; tumor appeared after fourth; also had abscess of the breast.
4. Birkett[4]	Marri'd	3 yrs.	28 yrs.	1 yr.	Right breast, inner half.	Slow.	Not stated.	Last 2 months	Pus, one cyst.	....	Spontaneous opening.	
5. Birkett[4]	Marri'd	Not stated.	40 yrs.	11 yrs.	Right breast.	Not stated.	3 in. in circumference.	Last 3 years.	Clear fluid, one cyst.	....	Amputation of breast.	Microscope showed echinococci.
6. Birkett[4]	Marri'd	While suckling child.	28 yrs.	6 yrs.	Right breast, upper outer quadrant.	Not stated.	4 in. in diameter.	Almost none.	Clear fluid, mother and daughter cysts.	....	Excision.	Microscope showed booklets.
7. Bryant[5]	Marri'd	3 yrs.	25 yrs.	5 yrs.	Left breast, upper half.	Slow.	Cocoanut.	None.	Clear fluid, mother and daughter cysts.	None.	Incision and drainage.	Recovery 3 weeks.
8. Astley Cooper[6]	....	....	....	....	....	....	....	....	....	....	....	Specimen in St. Thomas' Hospital, discharged by ulceration from an abscess of the breast.
9. De Haen[8]	....	....	....	....	....	....	Fist.	....	Cloudy fluid, four cysts.	....	Excision.	Diagnosed as scirrhus.
10. Dubourg[9]	Marri'd	3 yrs.	22 yrs.	4 yrs.	Right breast, lower inner quadrant.	Slow.	Mandarin.	None.	Clear fluid, mother and daughter cysts.	None.	Excision.	Tumor oblong, irregular, nodular.
11. Dubreuil[10]	....	....	42 yrs.	2 yrs.	Right breast, upper half.	Slow.	Fist.	Last 2 months	Pus, small hydatid cysts.	None.	Incision and drainage.	

12. Dupuytren[11]	Marri'd	While suckling child.	28 yrs.	20 mos.	Left breast.	....	Turkey egg.	Slight.	Clear fluid, daughter cysts.	....	Incision and packing.	Position of growth vaguely described; may have been in pectoral muscle.
13. Finsen[12]	....	....	....	....	....	....	....	....	....	....	....	States only that he has observed one case.
14. Fischer[13]	Single	....	17 yrs.	4 yrs.	Right breast, upper outer quadrant.	Stationary 3 yrs.	Apple.	Last year.	Mother and daughter cysts.	None.	Excision.	Diagnosed as adenoma; digestive disturbances previous to appearance of tumor.
15. Franceschi[14]	Marri'd	Three confinements.	23 yrs.	2 yrs.	Left breast, central.	Slow.	2 by 4 inches.	Occasional.	Clear fluid, hooklets.	None.	Excision.	Tumor irregular and lobulated.
16. Franceschi[14]	Marri'd	Following miscarriage.	21 yrs.	18 mos.	Right breast, upper outer quadrant.	Slow.	Turkey egg.	None.	Clear fluid.	Slight.	Excision.	Tumor hard and nodular: pathological examination showed characteristics of hydatid cyst.
17. Graham[15]	Marri'd	Preceding tumor.	....	7 yrs.	Right breast, upper outer quadrant.	Grew only during lactations.	Not stated.	Last few days.	Clear fluid, hooklets.	Present.	Incision.	Tumor appeared after fifth labor; four labors since; grew only during last three lactations.
18. Henry[17]	Marri'd	....	23 yrs.	5 yrs.	Left breast, lower inner quadrant.	Stationary 3 yrs.	Orange.	Last 2 years.	Cloudy fluid, mother and daughter cysts.	Present	Excision.	Recovery 27 days; suffered from tapeworm in childhood.
19. Höppener[18]	Marri'd	....	35 yrs.	6 yrs.	Left breast, upper outer quadrant.	Stationary 5 yrs.	Fist.	Last 6 months	Pus, mother and daughter cysts.	None.	Spontaneous opening; later incision.	Intestinal catarrh for 8 years previous to appearance of tumor.
20. Jonassen[1]	Single	....	....	....	Left breast.	....	Egg.	....	One cyst with scolices and hooklets.	....	Excision.	Tumor of several years' duration; patient aged 34 years.
21. Lauenstein[19]	Marri'd	....	37 yrs.	11 yrs.	Right breast, upper half.	Stationary 8 yrs.	Not to be cov'd with hand.	None.	Fluid and seventy daughter cysts.	....	Incision	Recovery 9 weeks; married 28 years; mother of 9 children.
22. Le Conte	Marri'd	Miscarriage 2 yrs.	23 yrs.	4 yrs.	Right breast, 2 inches above nipple.	Stationary 2 yrs.	Cocoanut.	Occasional during last 2 years.	Pus containing hooklets.	Present.	Amputation with removal of axillary glands.	Rapid growth follow'd a traumatism.

Recorder and reference number.	Marri'd or single.	Previous births.	Tumor.							Axillary enlargement.	Operation.	Remarks.
			First noticed	Duration.	Position.	Characteristics of growth.	Size.	Pain.	Contents.			
23. Le Dentu [20]	....	....	37 yrs.	2 yrs.	Right breast, outer half.	Slow.	Small billiard ball.	None.	Mother cyst.	Present.	Excision.	Diagnosed as carcinoma.
24. Lenzi [21]	Marri'd	....	25 yrs.	18 mos.	Right breast.	Slow.	Egg.	Slight.	Clear fluid and scolices	....	Excision.	Said to have followed a blow.
25. MacGillivray [22]	....	....	23 yrs.	4 yrs.	Right breast, upper inner quadrant.	Stationary some months	Egg.	....	Pus and putty material.	....	Puncture followed by excision.	
26. MacGillivray [22]	....	....	38 yrs.	6 yrs.	....	Stationary long time.	Large.	....	Mother and daughter cysts.	None.	Excision.	Tumor hard and lobulated.
27. Malgaigne [23]	Marri'd	4 yrs.	36 yrs.	6 yrs.	Left breast, lower inner quadrant.	Stationary 1 year.	Pigeon egg.	None.	Straw fluid, mother cyst.	None.	Partial excision.	Nearly healed in one week.
28. Michaelis [24]	....	....	....	....	Left breast.	....	....	....	Cyst size of pigeon egg.	....	Excision.	Diagnosed as scirrhus; patient aged 21 years.
29. Moutet [25]	Marri'd	....	....	....	....	....	Large.	....	Hydatids found.	....	Incision.	
30. Schmidt [26]	Marri'd	21 mos.	42 yrs.	21 yrs.	Right breast, upper outer quadrant.	Stationary 14 yrs.	Two fists.	Last few years.	Clear fluid, mother and daughter cysts.	Present.	Spontaneous opening; later excision.	Recovery 23 days.
31. Symonds [28]	....	....	28 yrs.	2 yrs.	Right breast, upper half.	....	3 in. in circumference.	....	Clear fluid.	....	Excision.	Daughter cysts or booklets not found.
32. Toca [30]	Single	....	19 yrs.	2 yrs.	Left breast, upper outer quadrant.	Slow.	Apple.	Last year.	Clear fluid. mother and daughter cysts	....	Incision followed by suppuration	Recovery 78 days.
33. White [32]	Marri'd	Not stated.	56 yrs.	4 yrs.	Right breast, upper outer quadrant.	Slow.	Walnut	Constant.	Pus, one cyst.	....	Incision.	Recovery 4 weeks; also hydatid cyst in left arm below insertion of deltoid muscle.

Statistics. In the United States and Canada, Osler, up to 1891, collected 85 cases of hydatid disease, and Alfred Mann has since added 24 more, making a total of 109 cases. In none of these was the hydatid disease in the breast. In Europe, Davaine, up to 1877, gives a critical analysis of 253 cases, and does not mention one of the breast. Madelung collected in Mecklenburg 196 cases, of which 91 were women, with none in the breast. Cobbald's 136 cases show one in the breast. Böckmann during ten years at the Berlin Charité collected 33 cases, 14 of which were women, with none in the breast. Finsen, in Iceland, up to 1869, saw 253 cases, 181 of these being women, with one in the breast. In some combined statistics of Europe, including cases collected by Neisser, Davaine, Finsen, Cobbald, etc., over 1800 cases were represented, and probably 12 or 15 would be a fair representation of the number in which the breast was involved. In Australia, Thomas, up to 1884, collected 1417 single and multiple hydatid cysts, three of which were in the breast, but in 541 the situation of the cyst is not mentioned. Thomas has also tabulated 1897 cases, drawn from European, Australian, American, and Indian sources; 20 of these cases were in the mamma, a percentage of 1.054. Such a percentage seems to me entirely too high, for in combined statistics many doubtful cases creep in which it is impossible for the collector to verify. Without any figures to substantiate it, I believe that 1 per cent. will fairly represent mammary involvement in women, between the age of puberty and the period of the climacteric, who are suffering from hydatid disease. When we compare hydatid cyst with other tumors of the breast the fraction becomes so small as to be insignificant.

Sex. The condition is confined to women, as there is no record of a case in a male breast.

Age. The age of the woman at the time the tumor was first noticed varies from seventeen years to forty-two years, with one exception. In this case, reported by White, the woman was fifty-six years of age when she first noticed the growth, but White does not mention whether menstruation was still present or not. No cases in childhood are recorded. We may, therefore, say that the disease begins only after puberty and probably before the climacteric; in other words, during the child-bearing period.

Single and Married. Of the four single women in the table, the ages of three are noted, respectively, seventeen, nineteen, and twenty-one, the age of highest development of the breast in the single woman. Of the 18 married women previous pregnancies are spoken of in 11, and in 7 no mention is made of the subject. In these 11 cases the tumor was noticed four times immediately after confinement or a miscarriage, the period when the breast is at its highest physiological development. In the other 7 cases pregnancy is noted in 2 two years previously, in 3 three years previously, and in 1 four years previously. In 1 the woman had three pregnancies, but the date of the confinements are not stated. We may, therefore, conclude that the parasite finds a lodgement in the mamma only when that organ is richly supplied with blood.

BREAST AND POSITION OF TUMOR. In 18 cases the right breast was involved, in 10 the left, and in 5 it is not mentioned. The position the growth first occupied is mentioned in 22 cases—8 upper outer quadrant, 1 upper inner quadrant, 4 lower inner quadrant, 4 upper half, 2 lower half, 1 outer half, 1 inner half, and in 1 the position is noted as central under the nipple. There is nothing particularly significant about the breast involved or the portion of the organ where the parasite develops, although the upper half seems to be involved twice as frequently as the lower, and the right breast almost twice as often as the left.

CHARACTERISTICS OF THE TUMOR. In all cases the tumor was first noticed as a small, hard, movable lump, not adherent to the skin or to the pectoral muscle Pain was conspicuous by its absence, and even tenderness was seldom spoken of. In many cases the hardness of the tumor was especially referred to. The mode of growth is rather characteristic. In 13 cases the tumor, more or less continuously, slowly increased in size; in the other 10 cases periods of time were noticed in which no perceptible growth occurred. These periods varied from several months to eight and even fourteen years. In two or three cases traumatism was attributed as the cause of the tumor, and in several the previously noted tumor took on a rapid growth after traumatism. In one case two lactations followed the appearance of the cyst; during the first the tumor remained quiescent, but the second seemed to induce a rapid growth. In but one case—White's—were the cysts multiple, one in the right breast and one in the left arm below the insertion of the deltoid muscle. The tumor was usually noted as round or oval, with a smooth surface, but in four it is spoken of as nodular or lobulated, and of irregular outline. Pain was seldom spoken of except in the later stages, and was associated principally with the period of rapid growth. It was these two symptoms—pain and the rapid increase in size—which caused most of the patients to consult a physician. Adherence to the skin or underlying pectoral fascia occurred only in the later stages of the tumor and seemed to be a precursor of ulceration with a spontaneous opening. In one case, beside adherence to the skin, there was retraction of the nipple. Enlargement of the axillary glands was noted in 6 cases; in 1, however, the enlargement antedated the tumor; in 12 it was noted as absent, and in the remainder it is not mentioned. In no case was fluctuation detected in the growth until it had reached a large size, and even then in some cases the cyst wall was so thick and tense as to give the impression of a solid growth. Crepitation, or hydatid thrill, which is sometimes elicited in echinococcus cyst of other organs, was never noted. Erythema, or urticaria of the skin, the so-called hydatid rash, which has appeared several times after aspiration of a cyst of the liver, has never been seen after aspiration or puncture of a hydatid of the breast. As the cyst increased in size the glandular tissue of the breast atrophied, probably from pressure, so that when the tumor was very large but little breast tissue could be recognized around it.

DEGENERATION AND DEATH OF THE HYDATID. As in other situations of the body, hydatid cyst of the breast is prone to undergo degeneration. When the cyst is large, say from the size of an egg to its largest extent, suppuration is apt to occur in the cyst. The apparent causes for this change may be a traumatism or applications of stimulating or irritating ointments. When suppuration occurs adhesion of the cyst wall to the skin rapidly follows, with later ulceration and formation of one or more sinuses. In this way daughter cysts have been observed escaping from what was termed an abscess of the breast. In five of the cases recorded a spontaneous opening of this character occurred, with a discharge of pus and hydatid débris. Under such circumstances the disease will tend to cure itself without surgical interference, although the convalescence may be a very slow one. There is also another mode of death to which the hydatid is liable without the rupture of the cyst wall. As Thomas has pointed out, cases are not rarely encountered in the post-mortem room where hydatid cysts have solid contents resembling putty in appearance, instead of the usual watery fluid. The microscope shows this putty-like material to consist of fat and granular débris, carbonate and phosphate of lime, cholesterine, hooklets, and broken-down hydatid membrane and scolices. The causes which lead to such a death of the parasite are probably numerous. First. The animal may have reached its natural term of existence, in which case decay and death would follow as a sequence. Second. The production of daughter cysts may be so numerous as to destroy the mother cyst by pressure. Cases are on record in which collapsed daughter cysts were so closely packed as to resemble the dried raisins of commerce. Third. The growth of the hydatid may be much more rapid than the outer or surrounding fibrous sac. This relative disproportion of growth causes the endocyst to become doubled and involuted on itself, and the fluid which the parasite should contain is replaced by the membrane of the animal; a time will soon come, then, when the food-supply is no longer sufficient to support the life of the animal. Fourth. The outer fibrous sac, like all similar connective tissue growths, tends with advancing age to contract and become more dense, diminishing the calibre of its vessels and interfering with the circulation in its substance, thereby producing degenerative changes which later lead to the formation of calcareous plates. As a result of this degeneration, the supply of nourishment to the endocyst is gradually reduced until the animal dies. Of all these probable causes of the death of the parasite the most important perhaps is the condition of the fibrous sac. In one case reported by MacGillivray a cyst the size of an egg was found filled with this putty-like material. In the breast, then, we have examples of both forms of spontaneous cure of the disease recorded. Whenever the contents of a hydatid has altered from a clear fluid, degenerative changes are said to have begun, no matter how slight the opalescence or cloudiness may be. The variations from a slightly turbid fluid to pus or putty material is one only of degree, and they are related as a beginning decay is to a complete one. Of the 24 cases in which the fluid contents of the cyst was noted 16 are reported as clear and 8 as showing some degenerative change in the organism. It may, therefore, be stated that hydatid cysts of the breasts are prone to degenerative changes.

It will be remembered that in four of the cases the tumor was spoken of as nodular or lobulated and of irregular outline. In an organ so superficially situated as the mamma it might be expected that the cyst would invariably present a uniformly smooth and rounded appearance, especially as the underlying muscle and chest wall would be the only point of resistance. May not this nodular appearance be explained by the degenerative processes which take place in the fibrous capsule? These degenerative thickenings and calcareous changes in the sac are never uniform, but vary greatly in different portions of the capsule. If, as they are proceeding, the animal within is also undergoing vigorous growth, the thinner portions of the capsule would stretch and bulge, producing an irregular or nodular contour. The lobulated appearance would simply mean, then, that degenerative changes had begun in the fibrous capsule, and if these changes persisted the nutrition of the parasites would be interfered with and ultimately lead to the death of the organism. We may, therefore, consider the nodular shape as the beginning of a spontaneous cure of the disease.

SUMMARY. Hydatid disease of the breast occurs only in women from the age of puberty to the climacteric. It is characterized by the appearance of a small, hard, painless tumor situated in any portion of the glandular tissue of the breast, freely movable with the surrounding breast tissue, either growing slowly or with a more or less long period of inaction. The firmness of the tumor continues until it attains considerable size, and even then the characteristics of a cyst are seldom present. For the most part the growth is smooth and of round or oval shape. Enlargement of the axillary glands, severe pain, irregular outline, and adhesion to the skin are characteristic of inflammation outside of the sac, or degenerative changes in the sac wall, leading ultimately to the death of the organism and a spontaneous cure, either through ulceration or encapsulation. Pain is also associated with rapid growth.

DIAGNOSIS. Owing to the great rarity of the condition, the diagnosis previous to operation or spontaneous opening will always be an extremely difficult one. In the young it will naturally be mistaken for adenoma; in the old, when adherence to the skin and axillary enlargement have taken place, a malignant growth will seem probable. It will scarcely be profitable to discuss the various diseases which it may simulate. The diagnosis can alone be positively made with the exploring needle and the microscope.

TREATMENT. Although the growth has a tendency to limit itself with a spontaneous cure of the disease, it would never be wise to wait for such a condition to occur, or to attempt to bring it about by the application of irritant or escharotic drugs. Such applications were frequently made a century ago when the dread of the knife and its consequences were feared. Nor should aspiration be used except as a means of making a diagnosis. The treatment should always be operative, and may be divided under four headings, according to the conditions present:

1. When the cyst is young and not very adherent to the surrounding breast tissue, dissect it out and close the wound without drainage.

2. When the cyst is old and larger and so intimately connected to the breast that excision would involve a considerable mutilation of the glandular tissue of the mamma, incise the growth freely and evacuate its contents, and then pack or drain, so that granulation may take place from the bottom.

3. When the cyst is quite large, thick-walled, and firmly adherent, but is still surrounded by a considerable portion of the breast tissue, make a partial amputation of the breast.

4. When the cyst is so large that most of the breast tissue has disappeared through atrophy, or when the nipple is involved and adherent to the growth, a complete amputation of the breast should be done.

No death has been recorded in hydatid disease of the breast, not even when suppuration has persisted for months after a spontaneous opening. In other portions of the body hydatid cysts have proved fatal from prolonged suppuration, either from exhaustion or from amyloid changes.

MODE OF ENTRANCE OF THE PARASITE. It has been suggested, notably by Dennis, that the parasite may gain access to the gland in the same manner that the streptococci and staphylococci do in abscess of the breast—*i. e.*, through the nipple.* Dr. Dougan Bird has accounted for the remarkable frequency of lung hydatids in Australia on the ground that the ovum is inhaled and starts its growth directly in some part of the air passages. According to our present views neither of these hypotheses can be correct, for it seems necessary that the eggs must enter the stomach in order that their envelope may be digested by the gastric juice and the enclosed embryo set free. I cannot do better than quote from Thomas the causes that influence the seat of hydatids in the body: "It may naturally be supposed that the liver becomes the most frequent seat of these cysts, because the embryos, after finding their way into the portal vein, here meet with the first obstruction to their passage through the capillary system; but many do find passage through it, and, travelling through the inferior vena cava, enter successively the right auricle and ventricle of the heart, and thence by the pulmonary artery reach the pulmonary capillaries, where again a considerable number abide; others run the gauntlet of this second obstruction, and pass by the pulmonary veins into the left side of the heart, and subsequently become conveyed by the current of the systemic circulation to the most remote and varied parts of the body of their host." Such a theory will coincide perfectly with a majority of the cases of hydatid of the breast. If the woman is unmarried we observed the embryo find lodgement in the mamma only when the blood-supply to the gland is at its maximum—namely, shortly after puberty. If it be a married woman, the time of lactation or shortly after it seems to be the chosen moment, when the gland is physiologically in its highest state of development and requiring its maximum of blood. But, as Thomas remarks, it is probable that so simple and mechanical an explanation does not convey the whole truth, for every cystic tapeworm has certain chosen seats in its host, although the echinococcus seems to enjoy the widest distribution of any of the parasites.

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* It has never been proved that bacteria can enter the breast through the nipple, for in abscess of the breast an abrasion of the skin will be found if looked for.

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A CONTRIBUTION TO THE PATHOLOGICAL ANATOMY OF SPORADIC CRETINISM.[1]

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In the latter part of 1897, Mr. S., of Reading, Pa., consulted one of us (Packard) because of hepatic insufficiency. In obtaining the routine history of this case it was found that one of his children, aged six years, was idiotic and undeveloped. Further questioning confirmed the opinion at first formed, that this might be a case of cretinism. He was urged to bring his child to the city, where it could be properly placed upon thyroid treatment. Accordingly, the child was admitted to the Children's Hospital on December 7, 1897. Nothing in the family history had any bearing upon the case. Two other children, born respectively before and after this child, were perfectly healthy. Although he was not weighed at birth, the subject of the paper seemed to be of normal size and development. He was breast-fed until he was twenty months old. At four weeks of age, while in his mother's arms, he had some sort of an attack in which he seemed to lose all power in the body and had complete arrest of respiration. He was taken to the fresh air, and soon revived. From this time it was noticed that his tongue protruded constantly from his mouth, and after this attack until he was two years old he cried almost constantly, sleeping only at intervals of a half hour's duration. It was noted that he grew very slowly, but at no time was it observed that he had distinctly ceased to grow. He was weaned at the age of twenty months, and was then fed on water crackers, soft-boiled eggs, and milk until three years of age, when he was given ordinary children's diet. For his whole life he has been intensely constipated, his bowels never moving more than three times a week. From the age of three to five years he never had a bowel movement without the use of a soap-and-water enema. During the early part of the period last mentioned he had obstinate constipation for ten days in spite of efforts applied both by the mouth and the rectum.

When admitted, although six years of age, he measured only 81 cm. He was unable to talk, and understood nothing but a few words, and those only when spoken with a certain tone of voice. He lay back among the pillows, perfectly apathetic, and not moving except for an occasional slight rolling of the head. The skin was of a peculiar yellowish-white color, and the mucous membranes were quite red. The features were heavy and doughy, the eyes half-closed with thick lids. The nares were widely opened, the alæ being decidedly thickened. The tongue was held constantly protruding from the mouth, and measured 4 cm. in width and 1½ cm. in thickness, completely filling the orifice of the lips, and being very doughy to the touch. He had a full set of temporary teeth, but they were stunted, wide apart, and most of them plainly decayed. The lips were very thick, the angles of the mouth rounded. The pupils were equal and natural, the eyelashes well developed. The scalp was almost completely devoid of hair, and had over it in places thick, oily, yellowish crusts. The anterior fontanelle was widely open and pulsating. The ears appeared of a size proportionate to the rest of the body. The circumference of the head was 50 cm., the neck was very large and full, and at the base was surrounded with a thick collar of doughy consistence, measuring 32 cm. in circumference. The whole appearance of the face was distinctly porcine and devoid of expression. The tissues of the upper extremity were very thick and heavy, especially in the forearms, which felt as though they were the seat of solid œdema. The hands were pudgy and short, and the skin of the hands curiously wrinkled. The trunk had a curious shape, owing to the huge development of the soft parts, and the small relative size of the hips. The chest was round, much expanded at the base, and the costosternal angle formed almost a straight line. Owing to the thickness of the neck the condition of the thyroid gland could not be made out, although it was not apparently enlarged. Careful examination of the lungs, heart, liver, and spleen showed no abnormality. The abdomen was very aldermanic, and there was a quite large umbilical hernia. The spine was straight except in the lumbar and lower dorsal regions, where there was distinct bowing. The genitalia were well developed, both testicles descended, and the prepuce was rather long. The lower extremities showed distinct bowing, with great rolls of tissue at the normal flexures. The feet were noted to have the same curious wrinkled appearance that was present in the hands. It was soon found that while he could take solids fairly well it was impossible for him to swallow liquids. His weight on admission was twenty-seven pounds eleven ounces. Four days after admission he was placed on two grains of thyroid extract three times daily. This was continued until January 2d, at which time he had lost in weight three pounds and thirteen ounces. Even as early as nine days after admission decided improvement was noted, and he was found in a feeble way attempting to amuse the children in the ward by throwing things on the floor. By December 23d it was noticed that the tongue was less constantly protruded, that he frequently smiled and looked around the ward, and that he was able to take fluids much better than on admission. By December 28th, three weeks after admission, his skin was becoming wrinkled and the collar of fat was rapidly disappearing. On January 2d the dose of thyroid extract was diminished, owing to an apparent weak attack which he had had on that morning. One grain was given three times daily from January 2d until January 16th. On the latter date he weighed twenty-two pounds two ounces, a loss of five pounds nine ounces in the five weeks since his admission. During this period he steadily improved as regards his general appearance, while his mental condition had showed a manifest change. On January 12th he was found to measure 2½ cm. more in length than he did on admission, about one month before. On January 16th the dose of thyroid was decreased to one-half grain, and on the 19th it was reduced to one-quarter of a grain three times daily. On January 22d he weighed twenty-one pounds four ounces. the lowest weight recorded up to that time. Owing to his seeming rather weak the dose of thyroid gland was diminished to one-quarter of a grain daily from January 29th to February 10th. On the 20th of the latter month his length was 85 cm., a growth of 4 cm. since his admission. His weight was twenty-one pounds eight ounces, or six pounds and three ounces less than on admission. With his improvement in other directions his bowels also showed a greater tendency to move naturally. He was kept on the thyroid extract in doses of one-quarter of a grain two or three times daily until April 14th, when he was taken back to his home. When he left the hospital, in the middle of April, he had ceased losing weight, was bright and active, took an interest in his surroundings, recognized his favorite nurses, cried when he considered himself slighted, and in every way acted quite naturally. He showed himself to be of a very affectionate disposition, and recognized with pleasure the return of his parents, whom he had not seen for some months. While he was at his home he seemed to gain even more as regards his mental power. He there played with the other children, learned to feed himself, and gained about two pounds in weight. He was brought back to the hospital on May 6th, and was found to weigh twenty-five pounds. On his return to the hospital he seemed to recognize the nurse who had taken care of him before, and, as nearly as could be told, remembered his surroundings. On his admission he was again put on the extract of thyroid in doses of one-quarter of a grain three times daily. His weight on re-admission was twenty four pounds. The thyroid extract was continued, but he was sent to the country branch, where he gained in weight, apparently from his more healthy surroundings in the fresh air. He remained in the hospital on this occasion until July 26th, when he was discharged, looking very different than on his first admission. He was readmitted to the hospital on October 20, 1898. While at home he had been doing very well, treatment being continued. He was learning to talk, was constantly creeping about, and trying to stand with the help of a chair, and certainly understood much that was said to him. During his stay at home he gained over six pounds in weight. His length had increased between the date of his first admission, December 7, 1897, and the date of his re-admission, October 20, 1898, to the extent of 9 cm. Re-examination on his last admission showed that the general appearance had decidedly improved; that the hair was well grown; that the anterior fontanelle was almost entirely closed, and that the tongue was kept constantly within the mouth. The abdomen was very much less distended, and the relative sizes of the chest, abdomen, and pelvis were much nearer normal. He stood quite well when given slight support, he laughed quite naturally and merrily, and in place of the feeble whine or grunt with which he expressed displeasure on his first admission the cry of anger or of grief was quite natural. He was again put on thyroid extract in doses of from one-quarter to one-half grain three times

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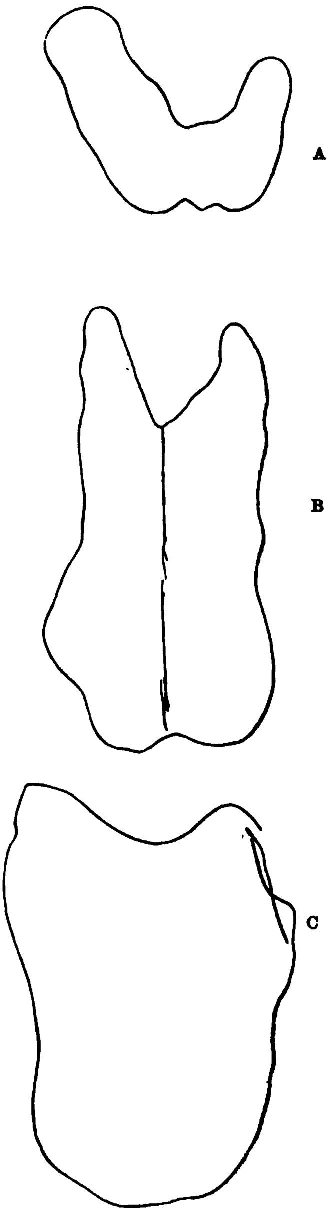
[1] Read at the meeting of the American Pediatric Society, May 26, 1901.

FIG. 1.



Actual length and breadth of thyroid and thymus glands.

A. Thyroid body.
B. Cervical portion of thymus.
C. Mediastinal portion of thymus.

daily, and this was followed by some loss of weight. Except for this, however, no material change occurred, until on November 5th he developed elevation of temperature, dry cough, abdominal distention, and coated tongue. The temperature gradually rose until it reached a range of from 104° to 105.5°, with occasional elevations even beyond that point. From the very onset of this acute attack he rapidly emaciated, became intensely adynamic, and died on November 12th, one week after the onset of his acute illness. During the whole course of this attack it seemed as though the resisting power was almost *nil*, and from the very outset it was evident that his illness was almost certain to terminate fatally.

Autopsy was performed three hours after death. Rigor mortis was present. There were dark purple ecchymoses, mainly over the left shoulder and upper arm, over both knees, and over the left tibia. Subcutaneous fat was well marked. The lungs were normal. Directly below the thyroid cartilage there was a body resembling the thyroid gland in external appearance, with a narrow constriction in the centre and two wings which nearly encircled the trachea, the right lobe being the larger. From the lower part of the body a vein ran directly downward into the left innominate. Below this evident thyroid body there were two tips of glandular substance in the position of the lower part of the normally placed thyroid gland. These bodies extended into the neck 1½ cm., and were the extension of a large mass of glandular tissue situated in the anterior mediastinum. The cervical part was composed of two lobes held by connective tissue. They showed on microscopical examination the typical structure of thymus gland. In the anterior mediastinum was another large mass, which also was composed of normal thymus tissue. The bronchial glands were not enlarged. The spleen was firm, pale red, and rather dry. The liver reached to the costal margin and had the appearance of being fatty.

The kidneys were lobulated, the cortex pale, and with marked stellate injection of the veins. The intestines showed on the peritoneal surface areas of congestion. In their lumen there was a small amount of yellowish-green fecal matter. From the jejunum down Peyer's patches were elevated and red, while some were distinctly ulcerated. Throughout the ileum there was wide-spread and intense folliculitis. The œsophagus showed injection of the mucous surface which felt like very fine sand-paper. The stomach was normal, as were also the pancreas and the suprarenals. In the superior longitudinal sinus of the brain there was a yellow thrombus. Nothing important was noted in the brain, except for the fact that the hypophysis measured 13x7x5 mm., which was considered abnormally large for a child of this size and age.

Microscopical Examination. Thyroid Gland. The alveoli are distinctly marked off by bands of white fibrous tissue, which is in greatest amount around the bloodvessels. The epithelial cells are abundant, showing considerable variation in size. The acini are small, many contain no colloid substance whatever, and in those in which the colloid is present it is in very small masses, the total amount in the section being scarcely more than that in two or three acini of a normal thyroid. Equally striking with the deficiency in colloid is the presence in the walls of the larger bloodvessels, especially the veins around the gland, of a decided calcareous change. This involves especially the media, with the formation of cavities surrounded by the calcareous deposit; in some places the process has extended to the adventitia and the intima, but in none of the sections was there visible a rupture of any of these "atheromatous abscesses" into the lumen of the bloodvessels. (Figs. 2 and 3.)

Thymus. Both the upper and lower bodies of the thymus were normal, the cells staining well.

The changes in the other organs were such as could be attributed not to the cretinism, but to the febrile infection, which resulted fatally.

Hypophysis. The acini are distinct and the glandular epithelium is abundant; the fibrous layer is scanty; the posterior lobe resembles the anterior.

Aorta. Normal; no sign of calcareous change.

Skin from Abdominal Wall. The horny layer is very thin; the rete mucosum is normal in appearance. In the papillæ of the cutis vera there is a wide-spread infiltration of lymphoid cells, which in the corium show a tendency to form aggregations. The nuclei of the corium are numerous and stain well. The fibres of connective tissue of the corium are all very coarse, those near the papillæ being slightly finer. The elastic fibres are few in number. In the deeper layers of the corium there is decided infiltration of lymphoid cells around the ducts of the sweat glands.

Liver. There is a universal fatty degeneration of the parenchyma with large areas in which the outlines of the cells are indistinct and the nuclei are imperfect. Distinct areas of focal necrosis are not made out, which would point to another than a typhoid infection.

Spleen. All of the nuclei stain poorly, and the cells are separated by a granular material.

Kidneys. There is a marked degeneration of the parenchyma throughout all the tubules.

Heart Muscle. There is a very slight cloudy swelling.

FIG. 2.

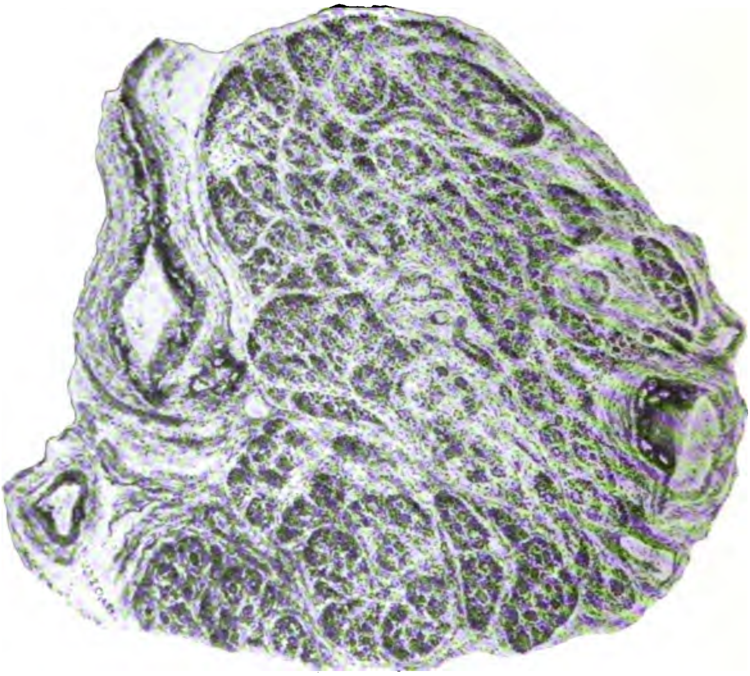
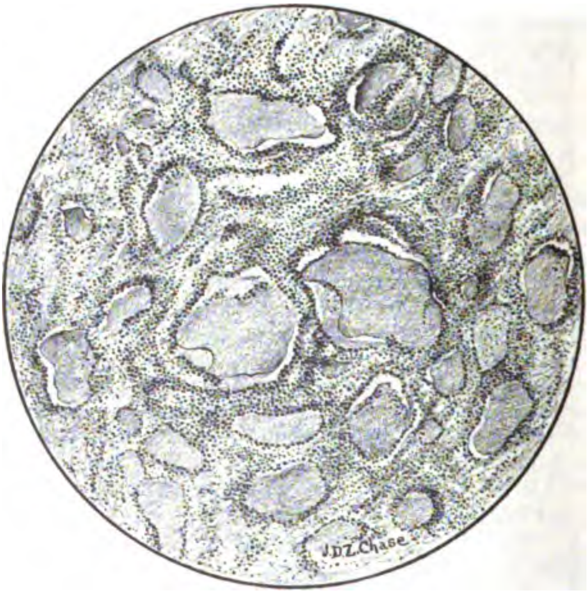


FIG. 3.



Thyroid gland from a normally developed child of nine years.

Suprarenals. The nuclei do not stain well. The layer of pigmented cells is not distinct.

Two or three points in this case seem to us to be worthy of more than passing mention. These we consider to be the rapid improvement under the use of the specific drug, thyroid extract; the extremely rapid malignant course of his infection, typhoid fever; the presence of enlargement of the pituitary body; the great increase in the size of the thymus gland; the presence of the thyroid gland, and the extensive disease of this, with calcification of the walls of the arteries going to it. In addition to this the intensity of the lesions produced by the typhoid toxin, and especially the necrobiotic changes occurring in the liver, are worthy of mention, because of their possible bearing upon the question of the resisting power of cretins treated by thyroid extract.

The rapid improvement in the mental and physical condition under treatment with thyroid gland is so ordinary an occurrence as to require no extensive consideration. We can find in the literature but few facts bearing upon the relative resisting power to infections possessed by the cretin as contrasted with the normal human being. In the *Lancet* of December 10, 1898, Byram Bramwell particularly remarks upon the fact that a female cretin, aged thirty-six years, " had never had any of the diseases peculiar to childhood, though she had been exposed to some of them. She had slept, for example, in a room with one of her sisters who was suffering from scarlet fever during the whole course of the disease, but did not take it." Among the reports that we have read there is no other evidence of any peculiar immunity presented by the cretin. One case mentioned by Osler,[1] occurring in the Indiana School for Feeble-minded Children, died from acute tuberculosis. This case had been under treatment with thyroid extract from September, 1895, until its illness in March, 1896. It is difficult to estimate to what extent and in what manner the resisting power of the cretin to disease in general is affected by diminishing the cretinoid condition through the administration of thyroid gland. In our case it seemed as though the resisting power was very slight, and from the very onset the child rapidly lost flesh and strength, became intensely adynamic, and died at the end of the first week from asthenia—a termination of typhoid seldom seen in childhood.

Nicholson[2] reports a case treated with thyroid extract from October, 1894, to July, 1895, with marked improvement. In the middle of the latter month the child " contracted measles of a most malignant type, and died on July 16th, after three days' illness." Nicholson states that a sister died of the same disease at the same time, and that apparently the treatment of the condition of cretinism did not render the child more susceptible or less resisting. We have been unable to find a sufficient number of cases thoroughly reported from which to draw conclusions as to the resisting power of cretins treated or untreated. Bourneville and Bricon[1] mentioned one cretin who passed successfully through attacks of erysipelas, and quoted a case of Charpentier's dying from erysipelas, and one of Ball's dying from "albuminuria with typhoid symptoms."

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[1] AMERICAN JOURNAL OF THE MEDICAL SCIENCES, October, 1897.

[2] Archives of Pediatrics, June, 1900.

So far as we can find, the first mention of enlargement of the hypophysis occurring in a cretin was reported by Boyce and Beadles.[2] In this case the cretin was nine years old, and growth had been arrested at the end of the first year. No trace of the thyroid was found, but the pituitary body was enlarged, so that it measured 1 cm. by 6.5 mm. (the measurement of the cut accompanying their article). In an autopsy upon a cretin well-known among Philadelphia men, who for years was a patient in the neurological ward of the Philadelphia Hospital, the autopsy, at which one of us (Packard) had the opportunity of being present, showed that while the thyroid gland was absent the pituitary body was not enlarged. In almost all of the fatal cases of sporadic cretinism the thyroid gland has been shown to be entirely absent. In the case of Bartine, briefly mentioned above, a careful search was made for this organ, and its complete absence was thoroughly demonstrated.

In forty-four cases of marked sporadic cretinism tabulated by Byram Bramwell[3] fourteen were fatal. In ten of these the condition of the thyroid gland was noted. In all but one of these ten there was no trace of thyroid gland remaining. Among Osler's cases, collected in 1897,[4] he narrates the case of a cretin, aged fourteen years, dying at the Indiana School for Feeble-minded Children. This child had been treated with thyroid extract with marked improvement, but died of acute tuberculosis about a year after treatment was instituted. The thyroid gland weighed four grammes, as contrasted with the normal weight of fifteen to twenty grammes. Careful study of this thyroid gland, made by Dr. Barker, agrees in some respects very closely with the examination of the thyroid gland from our case. The enlargement of the pituitary body in the case which we report has not been very frequently noted. In addition to the case of Boyce and Beadles, mentioned above, where this gland was enlarged, we find one mentioned by Comte, quoted from Burckhardt,[5] wherein the sella turcica was said to be very large, and the hypophysis hard, reddish, and of the size of a bean, its weight when fresh being 0.36 gramme. Microscopically it was found that it contained a large amount of colloid material both in the interior of the gland and in the canal, with small masses of colloid material within the acini. It also showed very many vessels filled with blood. In regard to the relative weight of this gland in his case, he compares it to two others from patients aged five and six years (his case being three years), who weighed 0.180 and 0.315 respectively, as contrasted with the weight of 0.360 in his case. Comte mentions the examination of the hypophysis made by himself in the case of a cretin dying two days after birth, in which the hypophysis weighed 0.123 gramme, and showed that the posterior or the nervous portion was composed, not of the ordinary nervous tissue of other hypophyses, but of the same form of tissue as composed the anterior lobe. In his case, also, the hypophysis was very vascular without excess of colloid material. The thyroid gland was present and weighed in the fresh state twenty-two grammes; microscopically it appeared to be very vascular and contained but a very small quantity of colloid substance. Particular mention is made of these few facts in regard to the hypophysis in cretinism since the observations of Rogowitsch, which seemed to show a compensatory action of the pituitary body in cases of experimental removal of the thyroid gland in animals.

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[1] Archives de Neurologie, September, 1896.

[2] Journal of Pathology and Bacteriology, 1893.

[3] Atlas of Clin. Med., vol. i. p. 17.

[4] Transactions of the Congress of American Physicians and Surgeons, vol. iv. p. 169.

[5] Ziegler's Beiträge, 1898, Bd. xxiii. p. 104.

A point which seems to us of more interest than any in connection with this case is the calcareous infiltration of the walls of the blood-vessels of the thyroid body. While we have been unable to make as thorough an examination into the literature of the subject as we could have wished, we have failed to come across any mention of such a change observed by others. Its significance cannot be definitely asserted, but the observation is of some interest because of the supposed relation between various diseases connected with the thyroid gland and the drinking water. We have written to many of the physicians in the town from which this boy came, but have but few replies in answer to our inquiries regarding the frequency of goitre, myxœdema, and cretinism in that locality. One surgeon with a large practice has written to us that he constantly has two or three cases of goitre under his care. His answer has been so recently received that we have not been able to obtain more exact particulars from him. Although an unscientific opinion, it may be mentioned that the father of this boy states that he knows two cases similar to his son's among people living in his immediate neighborhood. He has endeavored to persuade them to have their child placed under proper treatment, but without avail. This statement, of course, should not have much weight, but the family likeness of cretinism is so close and the appearance is so characteristic that a lay diagnosis of one painfully familiar with the picture might be received with consideration.

PSEUDOMEMBRANOUS INFLAMMATION OF THE MUCOUS MEMBRANES CAUSED BY THE PNEUMOCOCCUS.*

REVIEW OF THE LITERATURE AND REPORT OF A CASE OF PNEUMOCOCCIC PSEUDOMEMBRANOUS EXUDATION ON THE MUCOUS MEMBRANES OF THE MOUTH, TONGUE, THROAT, NOSE, EYES, GLANS PENIS, ANUS, ETC., COMPLICATING ACUTE LOBAR PNEUMONIA.

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AND

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The case here reported is remarkable in one respect only, *i. e.*, the occurrence, during the course of an attack of acute lobar pneumonia in a boy of eleven years, of a profuse pseudomembranous exudation upon nearly all the mucous surfaces of the body open to inspection, caused by the pneumococcus (diplococcus pneumoniæ). In addition to the visible fibrinous exudate upon the mucous membranes exposed to view, the case also showed signs of extensive adhesive pleuritis and marked and continued tympanites, with the passage of membranous shreds in the stools, leading to the belief that the fibrinous process involved also the pleuræ and the gastro-intestinal tract. Aside from these features the case showed nothing remarkable, pursuing a severe and protracted course which terminated by gradual lysis with recovery. The case will, therefore, be reported chiefly with reference to the unusual complications, omitting unimportant details relating to the more usual features of the disease—from the clinical side by Cary, who had charge of the case throughout, and from the pathological side by Lyon, who saw the case for the first time on January 17th in consultation with Cary—as follows:

Summary of case: Acute lobar pneumonia of both bases, with development during the first ten days of a profuse pseudomembranous exudate, first upon the tonsils and quickly extending to the mucous membranes of the lips, tongue, mouth, palate, throat, and nose, and transferred to the eyes, glans penis, and anus; physical signs of fibrinous pleuritis; marked and persistent tympanites; membranous shreds and mucus in the stools. Microscopical examination: bacillus diphtheriæ, streptococcus, saccharomyces albicans, etc., absent; diplococcus pneumoniæ present in abundance in the sputum and in the exudate from all locations, grown in cultures and injected into a rabbit and recovered from the organs and blood after death. Diagnosis: pneumococcic infection resulting in acute pneumonia, pleurisy,

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and fibrinous exudation upon the mucous membranes.—T. R., aged eleven years, a boy somewhat undersized and undeveloped for his age, of the best social condition and surroundings, was taken ill on January 5, 1901.

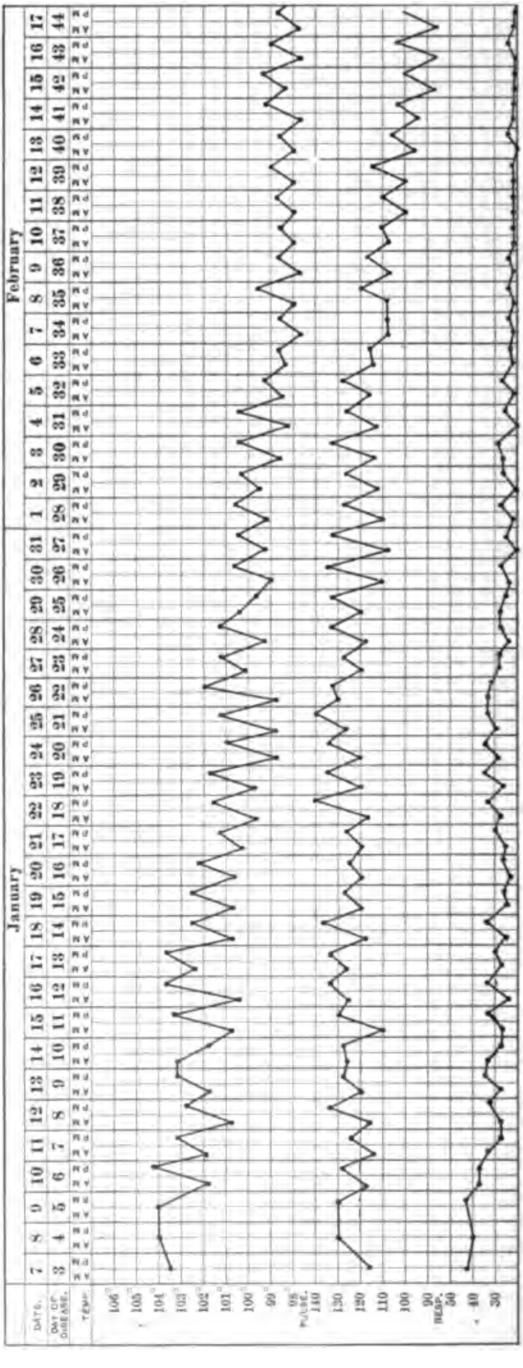
Family History. Negative.

Personal History. The patient has had the usual diseases of childhood. He had been a mouth-breather from enlarged tonsils, which were excised five years ago, since which he has been subject to frequent and severe attacks of follicular tonsillitis, of which as many as eight or nine sometimes occurred during a single season. Throat cultures made during these attacks always proved negative for the diphtheria bacillus. During the past year only a single attack of tonsillitis occurred. One year ago he had a short, slight attack of catarrhal pneumonia, from which he recovered without incident.

Present Illness. The present illness began on January 5, 1901, with sore-throat and fever, which were supposed by the boy's mother to indicate the onset of one of his accustomed attacks of tonsillitis, and he was treated with the usual remedies. On January 7th the family physician, Dr. Cary, was called, and found a reddened sore-throat (without exudation), signs indicating early involvement of the base of the left lung, and temperature 103.5° F., pulse 114, and respirations 42. Next day the temperature was 104° F., pulse 130, respirations 40, and the signs of pneumonia at the left base were more marked. On January 11th signs of consolidation of the right base also appeared, and the patient complained of a painful sore-throat. Examination showed an abundant white exudate covering both tonsils, from which a culture was made and was reported negative for the diphtheria bacillus by Dr. Thomas B. Carpenter, bacteriologist of the City Board of Health. In the meantime a marked vesicular eruption had appeared over the chest, following directly the application of turpentine and oil (1 : 6). The vesicles were numerous, discrete, and reached the size of a five-cent piece in some instances, and the sores left by them were an annoying feature in the early part of the illness.

On January 12th a herpetic eruption appeared upon the lips; the exudation was more or less general throughout the mouth and throat, and the eyes were the seat of a beginning conjunctivitis. Dr. H. Y. Grant, oculist, was placed in charge of the eyes, and active treatment was directed to them. On January 13th there was marked fibrinous conjunctivitis, and subconjunctival hemorrhages were scattered over the eyes, the lids were swollen and adherent, and photophobia was complained of. The mucous membranes covering the lips, gums, cheeks, margin and under surface of the tongue, hard and soft palate, fauces, tonsils, pharynx (as far back as could be seen), and nose were covered with a continuous, white, adherent exudate, which could be torn off in shreds and pieces, sometimes as large as a twenty-five-cent piece, leaving behind a raw, granular, bleeding surface. The boy could not be restrained entirely from picking at his nose and lips, and his fingers were seen to be bloodstained. He thus apparently transplanted the infection from one place to another.

On the evening of January 15th the glans penis (circumcised) became involved in the same membranous process, and next day was covered in its greater part by a thick, raised, adherent membrane, which extended to the meatus and caused the lips to be glued together, producing difficulty in micturition by pressure. The process did not, however,


DATE.
DAY OF DISEASE.
TEMP.
January
February
106°
105°
104°
103°
102°
101°
100°
99°
98°
PULSE.
140
130
120
110
100
90
RESP.
50
40
30

extend into the urethra. The membrane could be torn off in pieces, leaving behind a raw bleeding base similar to that seen in the mouth after removal of the exudate.

At this time a large piece of the membrane obtained from the mouth was submitted to Dr. Herbert D. Pease, bacteriologist to the New York State Pathological Laboratory of the University of Buffalo, who reported negatively for the diphtheria bacillus, but noted the presence of frequent diplococci, the nature of which, however, was undetermined, as the examination was somewhat cursory.

Next day, January 16th, an examination showed the anus also involved in a membranous deposit, and the nurse first noted the presence of membranous shreds in the stools. The deposit on the anus extended within the sphincter, though to what distance was not determined, as a speculum could not be introduced without much pain. A shred about two inches long was removed through the anus by winding it upon a match. For several days the abdomen had been distended with marked tympanites. The stools had been rather frequent, soft, contained considerable mucus, and much gas was expelled. The spleen was not palpable, and no rose spots appeared.

At this time the disease was at its height. Both lower lobes were consolidated. The membranous exudate was profuse and showed no signs of yielding to active local treatment. The breathing was noisy and labored, with seeming suffocation from the accumulation of mucus in the upper air passages. The expectoration, which was mostly swallowed, was thick, viscid, mucopurulent. The cough was constant, deep, and gagging. About this time, also, signs of extensive fibrinous pleuritis became marked, chiefly over the left base; the right base was also involved, but not so frankly. The pleural friction over the left base could be felt with the hand on the chest, as well as heard with the stethoscope. The patient's condition seemed critical.

On January 17th the case was first seen by Dr. Lyon in consultation with Dr. Cary, when the disease was at its height, and the following examinations were made by him:

Blood. Leucocytes, 16,600; hæmoglobin, 70 per cent. Differential leucocyte count: neutrophiles, 81 per cent.; small lymphocytes, 12 per cent.; large lymphocytes, 6.5 per cent.; eosinophiles, 0.5 per cent.; 400 counted. Red corpuscles well formed; an occasional normoblast. Fibrin increased. Widal test negative.

Sputa. Mucopurulent, yellowish-white in color, with an occasional reddish streak. Microscopically the sputa showed numerous pus cells, epithelial cells, sometimes containing brown granules (blood detritus), mucus, and fibrin; occasional red blood-corpuscles; a few very small fibrinous casts of the finer tubules with dendritic processes attached. Stained specimens showed numerous large diplococci, with wide capsules, morphologically identical with the diplococcus pneumoniæ. This organism stained by Gram, but the capsule was not clearly stained by Welch's method.

Membranous Exudate from Lips. Thick, white, gelatinous material, which was partly soluble in water, which latter gave the chemical reactions for mucin. The undissolved residue showed typical fibrin filaments and stained by Weigert's method. Stained specimens showed in abundance the same diplococci as found in the sputa, as well as an occasional single coccus. Numerous epithelial cells and leucocytes and much detritus were also found in the exudate. The *diphtheria bacillus, streptococcus, saccharomyces albicans, etc., absent.*

Membranous Exudate from Nose, Glans Penis, and Anus. All of these specimens were similar grossly and microscopically to the pseudomembrane from the mouth, all containing the same encapsulated diplococcus in large numbers, practically in pure culture, except the membrane from the anus, which showed, in addition to the diplococcus, contamination with the usual fecal flora. [It is worthy of note that in the case of the glans penis the exudate was not deposited upon a true mucous membrane, as was the case in all the other locations, for the boy had been circumcised in early childhood.]

Exudate from Conjunctivæ. This was flaky, and did not take the form of a uniform membranous deposit, as in the other locations involved. The same organism was found (pure) as in the other specimens, though less numerously, probably due to the active and continued treatment which the eyes had received (frequent irrigation, etc.).

Feces. Nothing characteristic was found except the same diplococci found elsewhere. The single specimen examined contained much mucus, but no fibrinous shreds.

Cultures. Pure cultures of the pneumococcus were obtained from the exudate from the eyes and nose, and mixed cultures of the pneumococcus and the staphylococcus pyogenes aureus from the membrane from the mouth and from the sputa. The diplococcus did not grow upon potato, and did not liquefy gelatin. It grew upon blood-serum, agar, glycerin-agar, and bouillon. It coagulated litmus milk, with the production of an acid reaction.

Inoculation. One minim of a suspension of the nasal exudate in normal saline solution was injected into the peritoneal cavity of a rabbit, which died in twenty-two hours with general peritonitis and septicæmia. The pneumococcus was obtained in pure culture from the heart's blood, organs, and peritoneal exudate. Stained smears from the heart's blood showed the pneumococcus typically in pairs, occasionally in short chains, with a wide capsule surrounding.

Urine. Several urinalyses were made by Dr. G. A. Himmelsbach, showing a trace of albumin, without casts, and the general characteristics of an acute febrile urine.

The eyes were practically clear and free from the exudate by January 28th. The mouth, throat, nose, and anus at this time showed improvement, but the exudate was still present in these locations in considerable amount. The membrane on the glans penis was less resistant and tended to dry up and disappear after a few days with active treatment. Gradually, after another week or ten days, the deposit over the other locations disappeared, after persisting for about four weeks in spite of active local treatment with various antiseptics. The tympanites lasted about two weeks and was a prominent feature of the disease.

The termination of the pneumonic process was by gradual lysis, as shown by the accompanying chart. The boy was allowed to sit up for the first time about the middle of February, and convalesced slowly. Slight dulness with pleural crepitation persisted over the left base, and was present when the boy was last examined, April 20, 1901.

Little remains to be said of this case after the recitation of the facts. That the production of a pseudomembranous exudate upon the various mucous membranes was caused by a specific local action of the pneumococcus cannot be doubted in view of the bacteriological findings. That the pneumococcus is capable of causing such lesions is attested by the reports of various observers. This case appears to be unique, however, in the wide extent of the process. Not only were involved nearly all the mucous membranes of the body that could be inspected, but probably the gastro-intestinal tract as well, as evidenced by the prolonged tympanites and the passage of membranous shreds and mucus in the stools. No other reported case has shown such a wide distribution. It is noteworthy also that the process was not entirely confined to the true mucous membranes, as the glans penis had been circumcised in early childhood. The infection seemed to have been transplanted from one place to another by the boy's fingers, which were bloodstained from picking at his nose and lips. The pleuræ of both sides were apparently involved in an extensive fibrinous pleuritis, and small fibrinous casts of the finer tubules were found in the sputa. All of these phenomena occurred as complications in the course of acute lobar pneumonia. There were fortunately no signs of endocarditis or pericarditis.

As but few cases of pneumococcic pseudomembranous inflammation of the mucous membranes are recorded in the literature, and most of these are of recent date, it will probably add to the interest and instruction of our case to briefly review the cases that we have been able to collect from the literature by a rather diligent search. Most of the text-books of medicine make no reference to such a process. The cases may be divided as those occurring in association with pneumonia and those occurring as a purely local infection independent of a pneumonic process, as follows:

Cases of Pseudomembranous Inflammation of Mucous Membranes Occurring in Association with Pneumonia. This class includes (*a*) cases in which the pneumococcic origin of the croupous exudate upon the mucous membranes was not proved, but merely suggested by its association with pneumonia, and (*b*) cases in which the pneumococcus was shown by bacteriological methods to be the specific agent in producing the lesion.

(*a*) *Pneumococcus not Found.* The earliest reference to croupous inflammation of mucous membranes as a complication of pneumonia that we have found is the statement by Bristowe,[1] in 1879, that "sometimes membranous patches on the mucous surface of the large intestine" occurred in acute pneumonia.

Osler[2] was the next (1885) to point out the same condition, reporting five cases of "croupous colitis" in one hundred autopsies on subjects dead of pneumonia. The process was represented usually by a "thin, flaky exudation involving only the surface of the mucous membrane. In none of the cases was there ulceration." "In one case (Case III.)

the cæcum was covered with a thin layer of adherent lymph, and scattered throughout the colon and sigmoid flexure there were numerous elevated patches of lymph, about the size and shape of rupia-crusts, which on section were found firmly attached to the mucosa. In this instance the process was very extensive, and the patches were thicker than in any subsequent case." In another case in this series of one hundred autopsies (Case IV.) "the stomach and duodenum were found greatly distended with gas. The mucosa was pale, except about the fundus, where, just to the left of the cardia, there was an extensive area of croupous inflammation, represented by a thick, adherent, grayish-white exudate, covering an area 12 by 8 cm. Beneath the mucosa the membrane was deeply injected."

Massalongo[3] is also credited with having reported a case of pseudomembranous enteritis as a complication of pneumonia.

Bardon[4] reported the case of a man, aged twenty-four years, who developed in the stage of resolution of pneumonia a pseudomembranous angina involving the entire pharynx.

(*b*) *Pneumococcus Found.* Weichselbaum[5] mentions briefly a case of lobar pneumonia and pleurisy with croupous enteritis. The pneumococcus was found in the intestinal croupous exudate, and was demonstrated by inoculation in animals.

Netter[6] observed a boy, aged three years, with varicella and urgent symptoms of laryngitis requiring tracheotomy, through the wound of which a false membrane was expelled, containing no diphtheria bacilli, but "only pneumococci with beautiful capsules and of average virulence." After some days bronchopneumonia of both bases supervened; recovery.

Rochon[7] described the following interesting case: A boy, aged two years, in the course of an attack of whooping-cough, developed severe and continued diarrhœa, with an eruption of vesicles about the anus. The examination of the clear contents of the vesicles, obtained with aseptic precautions, showed "pneumococci in pure culture" in smear preparations. During a severe fit of coughing on the eighth day of the diarrhœa a prolapsus of the rectum occurred, revealing the mucous membrane covered in places with a pseudomembranous exudate, which was removed with difficulty, leaving a red, granular base. The exudate, stained by Gram, showed "numerous pneumococci." Pneumonia of the upper portion of the left lung developed on the tenth day of the diarrhœal process, and death followed on the next day.

A. and V. Vedel[8] described the case of a child, aged two years, with bronchopneumonia at the left base and extensive pseudomembranous deposit involving the entire pharynx and the palate, lips, and nasal cavities; death after seven days from heart failure. In the pseudomembrane the pneumococcus was found in a state of purity, grown in pure culture, and proved fatal to a white rat after injection.

Ballay and Halipré[9] reported the case of a child, aged thirteen months, with bronchopneumonia, croupous exudate on both tonsils, and symptoms of laryngeal stenosis, supposed to be croupous, requiring intubation. Cultures from the tonsillar pseudomembrane showed only the pneumococcus. On the twelfth day purulent otitis media developed, but no bacteriological examination of the discharge from the ear was made. Convalescence was established on the twenty-fourth day.

Comby[10] says he has seen pneumococcic angina in two cases in infants precede pneumonia, which at first had the appearance of diphtheria.

Griffon[11] observed in a butcher, twenty-nine years old, in the course of acute pneumonia, a pseudomembranous inflammation involving the buccal mucous membrane opposite the molars on the left side, both tonsils, the palate, and the pharynx in an extensive network. Pure cultures of the pneumococcus were obtained from the pseudomembrane, and proved fatal to a mouse after injection. The croupous exudate disappeared in a few days. Tympanites was noted. A specific agglutinating reaction was claimed to have been obtained on cultures of the pneumococcus with the patient's blood.

Cases of Pseudomembranous Inflammation of Mucous Membranes of Pneumococcic Origin Independent of Pneumonia. Jaccoud,[12] who claims priority (1891) in establishing the existence of pseudomembranous angina caused by the pneumococcus, reported the case of a young man, nineteen years of age, who was suddenly taken with chill and fever, and showed on the second day a pseudomembranous exudation on both tonsils, the anterior pillars of the fauces, and the uvula. The false membrane showed all the histological characteristics of a true diphtheritic membrane, except the presence of the Klebs-Loeffler bacillus. Ménétrier, who made the bacteriological examinations, found "pneumococci in great abundance and almost pure" in the exudate, and cultures and inoculation experiments made by him "leave no doubt in this regard," *i. e.*, the pneumococcic origin of the process. The pseudomembranous process had ceased its activity by the ninth day, and the patient was well on the seventeenth day of the disease.

Jaccoud[13] also reported two similar cases in 1893, one a woman, aged twenty-six years, the other a girl of seventeen years, both with pseudomembranous inflammation of the tonsils, which made its appearance on the second day of the illness. In both cases Martin found "pneumococci in abundance in a state of purity, or sometimes accompanied by streptococci." The onset of the disease was marked by chill, shaking, and abrupt rise of temperature. Both cases terminated with recovery in three or four days. Based upon his three cases, Jaccoud attempted to draw a differential picture of pneumococcic angina, characterized by sudden onset, with chill, shaking, abrupt rise of temperature, short duration, and favorable course.

Seuvre[14] observed a boy, eight years old, who, in the course of an attack of grippe, developed an erythematous angina with signs of laryngeal stenosis, requiring tracheotomy, through the wound of which a false membrane was expelled, giving a pure culture of pneumococcus. Diphtheria bacilli were absent.

Comba[15] reported a case of pseudomembranous tonsillitis and double pseudomembranous conjunctivitis in a child of seven months, due to the pneumococcus.

Abel[16] reported a pseudomembranous inflammation in a boy of thirteen years, limited to the anterior nares, which finally disappeared after fourteen days. The deposit showed pneumococci in great abundance and a very few other organisms, but no diphtheria bacilli. Cultures and animal experiments showed that the pneumococcus was the only pathogenic organism in the exudate.

The earliest reference to pseudomembranous conjunctivitis ascribed to the pneumococcus is in the thesis by Morax,[17] who reported four cases from Parinaud's clinic, observed in the autumn of 1893, in infants ranging from eight days to two and one-half years in age. The process was characterized by the presence of pseudomembranous exudation on the lower lids, in which the pneumococcus was found pure and in abundance. The organism was grown in pure culture and recovered from animals dead after injection. The affection was always unilateral, running a short and benign course. The bulbar conjunctiva was never involved in the deposit.

Parinaud[18] reported cases of lachrymal conjunctivitis in the newborn in the first few days of life, showing fibrinous deposits or flakes mixed with the tears in the inferior cul-de-sac. In twelve cases the pneumococcus was found in abundance in the conjunctival secretion and grown in pure culture by Morax. The gonococcus and Weeks bacillus were totally absent. "This pneumococcic conjunctivitis of the newborn, as well as that of older infants, which Morax and I have described, may become pseudomembranous without ceasing to be benign, at least according to my observation."

Gifford[19] reported cases of pure pneumococcus conjunctivitis, and stated that he had also observed in these cases, as previously pointed out by Gasparini,[20] a fine pellicle of fibrin which could be wiped off from the everted upper tarsus, which had not been observed in conjunctivitis due to the Weeks bacillus.

Axenfeld[21] encountered a school epidemic of conjunctivitis, which involved twenty-four persons, showing pseudomembranous flakes. The cover-glass specimens, as well as cultures from the pseudomembranous exudate, showed characteristic pneumococci, and they were confirmed as such by Professor Behring. Animal inoculations resulted in typical pneumococcus septicæmia. The process ran its course in from three to ten days. Small ocular subconjunctival hemorrhages were noted.

As will have been observed, most of these reported cases of pneumococcus conjunctivitis were of a character that could hardly be described, strictly speaking, as pseudomembranous—*i. e.*, with an adherent fibrinous exudate on the conjunctiva—but were characterized by the presence of small fibrinous shreds in the exudate of the eye, sometimes lightly adherent to the mucous membrane of the lids. As a similar condition may often be found in the eye in almost any kind of acute conjunctivitis, it seems impracticable to draw any sharp and fast distinction between such cases and those that are more positively of a pseudomembranous nature. Within the past five years rather numerous cases[22] of pneumococcus conjunctivitis have been reported, but they have generally been without any definite pseudomembranous deposit. Such was the condition, also, in the case which we have described. The explanation of the relative freedom of the eye from croupous deposits is doubtless found in the mechanical difficulties offered to the development of such a process by the natural irrigation and drainage of the eye.

In addition to the above cited cases, which were reported more or less circumstantially, occasional references are also found in the literature to possible cases of true pneumococcic pseudomembranous angina, in which the pneumococcus is merely mentioned as occasionally found in or grown from the croupous exudate in a small percentage of a long series of cases of croupous angina studied bacteriologically, as, for instance, in the reports by Carl Janson,[23] De Blasi and Russo-Travali,[24] Cassedebat,[25] and others. The mere mention of finding pneumococci in such cases cannot, of course, be accepted as proof of the etiological relation of this organism to the morbid process, for it is well-known that occasional pneumococci may be found in the throats of a considerable proportion of healthy persons, usually estimated at 20 per cent., and can be grown in culture from such throats. Therefore, unless the pneumococcus be found in pure culture, or else as the predominating organism in the exudate, its presence is of not much significance.

The above cases, in which the pneumococcus was demonstrated as the cause of a local croupous inflammation, have all been reported within the last dozen years, and it is thus shown how recent is the recognition of the pneumococcus as an agent capable of exciting localized pseudomembranous inflammation of the mucous membranes of different parts of the body. Doubtless it is not so rare an agent in this condition as might be supposed from the paucity of reported cases, and will be shown by future investigation to be a not uncommon cause of pseudomembranous inflammation of the mucous membranes outside of the lungs.

There is nothing to distinguish the nature of the process from the similar condition associated with the diphtheria bacillus or the streptococcus, except the bacteriological examination, which should be made in all cases of pseudomembranous inflammation. The clinical course described by Jaccoud,[26] Weinberg,[27] and Gaultier[28] as characteristic of pneumococcus croupous angina* had no counterpart in our case, and would be of no value for excluding diphtheria, which may show the same clinical picture. As a rule, the cases have been mild, and after a short course have ended in recovery. How refractory to treatment, how long continued, and how infectious the process may exceptionally be are illustrated by our case. Most cases occur in childhood, though adults in the prime of life are sometimes affected. The mucous membranes of almost any part of the body may be involved, as illustrated by the cases cited. The process may be very limited or very extensive and almost general. It may occur in association with pneumonia during some part of its course, or may be quite independent of any pulmonary involvement. Local germicidal agents have usually been employed with apparent success, but failed entirely to have any good effect in our case. Whether due to it, or independently of it, and merely coincidently with its use—we would not venture an opinion—the process tended rather promptly to ameliorate and disappear upon the administration by mouth of drachm doses of fresh brewer's yeast.

In conclusion, we take pleasure in acknowledging our indebtedness to Professor William H. Welch, of Baltimore, for his very generous assistance in referring us to cases in the literature.

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* We have limited ourselves in this paper to a discussion of pneumococcic inflammation resulting in pseudomembranous exudation. It might be remarked, however, that the pneumococcus has been demonstrated as the cause of inflammation of the mucous membranes of all the following varieties: erythematous, follicular, herpetic, pseudomembranous, and suppurative. For a comprehensive discussion of these different varieties of pneumococcic angina and cases from the literature up to 1896, see Gaultier's thesis (loc. cit). In view of the occurrence of a herpetic or vesicular form of inflammation and the discovery of the pneumococcus pure in the contents of the vesicles, both in the throat and about the anus, it would be interesting to make observations on the contents of the herpes labialis, so commonly seen in pneumonia. It appears likely that these vesicles are caused by a local development of pneumococci, which would be found in the contents of the vesicles. We regret that such examination was not made in our case, and that we did not also examine the contents of the large vesicles that developed upon the chest, though in the latter case we, naturally enough, assumed the eruption to be merely the result of the local irritation of the turpentine that had been applied.

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ACUTE SPLENIC MILIARY TUBERCULOSIS.[1]

BY D. D. STEWART, M.D.,
OF PHILADELPHIA.

THAT the tubercular process, whether in an acute miliary or more chronic form, may have its only outward expression in the spleen, and remain there entirely limited for a greater or less period, is a fact little recognized, yet one which has been emphasized by several recorded cases.

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[1] Read at the Sixteenth Annual Meeting of the Association of American Physicians, held at Washington, D. C., April 30 to May 2, 1901.

As a chronic affection presumed primary tubercular splenomegaly is less infrequent than the acute miliary form. Bender,[1] who has recently published an exhaustive paper on the subject of tuberculosis of the spleen, alludes to some seven cases which he regards as instances of the former. In these Bender thought that the tubercular affection of the spleen was in so far limited to this viscus that involvement of other organs or parts gave no clinical manifestation. This, however, is an error concerning at least one of the cases which Bender quotes, in which splenectomy was performed—that of Bland Sutton. In this case Bland Sutton informs me the primary lesion was in the lung, and was of the nature of a " quiescent tuberculous cavity."

In Marriott's case[2] Bender is cognizant that the source of infection was perhaps a chronic vulvar ulcer which had been excised. Marriott curiously had reported this case as one of *acute* tuberculosis of the spleen. It is said there was no clinical indication of tuberculosis elsewhere, even at the end of two years, when a splenectomy was done, and eight months subsequently the patient was in good health.

It is not the purpose of this paper to discuss chronic tuberculous splenomegaly, but to draw especial attention to an acute form of miliary splenic tuberculosis, the occurrence of which, though extremely rare, seems undeniable, and which, because of its rarity, has been doubtless occasionally overlooked. But a solitary case has been recorded—Scharold's[3]—and it is most interesting. It is that of a convict, who, apparently previously in good health and employed in out-of-door labor, was suddenly seized with symptoms suggesting an acute overwhelming general infection. There were high fever, prostration of strength, headache, cough, epistaxis, and diarrhœa, retention of urine, delirium, and general cyanosis. The spleen was greatly enlarged. Death occurred on the seventeenth day. A necropsy showed a miliary tuberculosis limited to the much enlarged spleen. In the writer's case, although he cannot demonstrate that the infectious process was in onset or in early course limited to the spleen, yet he believes it is fair to assume this in view of the interesting symptomatology and because the instance of Scharold's shows that such a limited miliary tuberculous process may occur and actually run its course without other involvement.

The writer's case was one in which more than ordinary interest was taken, both on account of its unique character and because of an acquaintanceship with certain of the patient's relations, one of whom, a physician, under whose observation she had previously been, watched the progress of the ailment with him.

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[1] Gazette des Hôpitaux, March 31 and April 7, 1900.

[2] Lancet, November 23, 1895.

[3] Aerztliches Intelligenz-Blatt, August 7, 1888, No. 32.

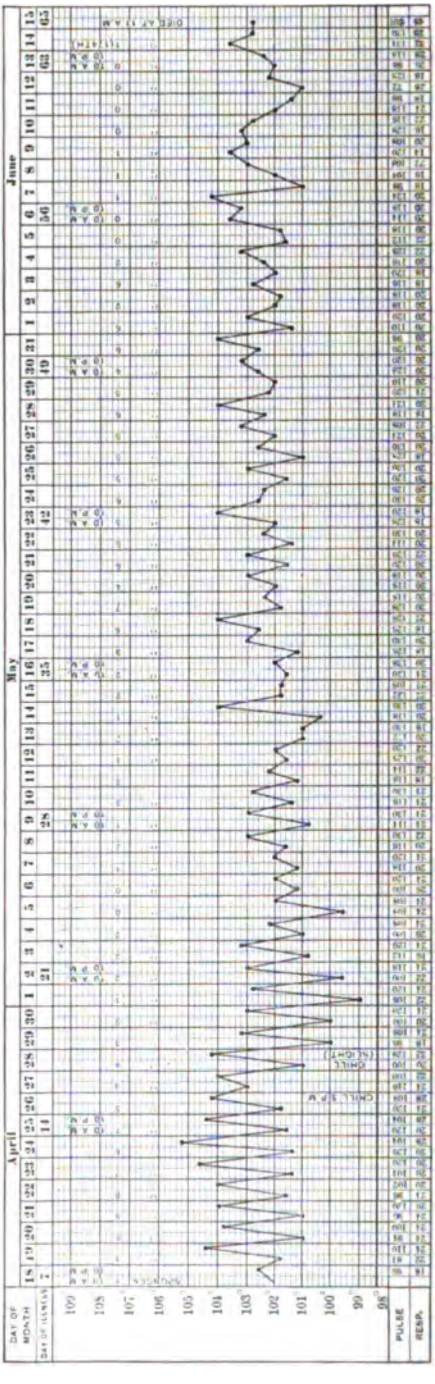
The patient was Emma W., aged twenty-nine years; by occupation a nurse; single; of German parentage and American birth; the fifth of ten children, all living save one killed in a railroad accident; brothers and sisters in good health; parents living; father a dyspeptic, but otherwise well; mother in robust health. The family history otherwise offered nothing noteworthy; no tubercular antecedents.

Previous History. She had had as a child scarlet fever, measles, and pneumonia. Had had ague seventeen years before, but had had no indications of this since. She was of slender build, but quite robust, and had had no illness to incapacitate her for years. About four weeks before admission to the hospital, after having just left a trying and long-continued case of typhoid fever, she had had a slight grippal attack lasting a few days. She was not confined to bed. Dr. Pottberg, her relative, had seen and prescribed for her. One week later, three weeks before admission to the Episcopal Hospital, when not recuperated from the grippe, ill-judged notions of humanity prompted her to take charge of a case of tuberculosis. The patient, living in her vicinity, had just lost his nurse; he was very ill and required constant attention. The consumptive, in indigent circumstances, had apartments which were badly heated and damp, and the nurse's nourishment was of poor quality. She ate irregularly, poorly, and lost sleep. She continued in charge for two weeks. In the middle of this second week she, herself, became rather acutely ill and had chills, with a rise in temperature, was debilitated, and had pain and aching in the dorsal region. She still continued in attendance for a few days despite these symptoms, until a successor could be procured, and then went to her lodgings. There she remained about a week, abed, during which time fever and debility continued. It is stated the temperature then ran between 101° and 103°, and she was presumed by her medical attendant to be developing typhoid fever. She was placed under my care at the Episcopal Hospital on about the tenth day of illness (April 18, 1900), and died the sixty-eighth day, fifty-eight days after admission.

An examination on admission elicited: Mind active, though expression dull, with tendency to somnolence. But neither the dull expression nor somnolent tendency was manifest after a few days spent in hospital. Had had slight chill every day or so since the ailment began.

Abdomen. No pain or tenderness or distention of the bowels. Spleen markedly enlarged, reaching above to sixth interspace, and inferiorly is readily palpable below the costal margin. No typhoid spots. Liver outline normal.

Chest. Heart sounds clear, though enfeebled; no murmurs. A searching examination of the lungs showed total absence of any indication of disease here. This repeated carefully daily gave similarly negative results until late in the progress of the case. The tongue was clean and of healthy appearance. This continued a feature until late in the disease. There were total loss of appetite, constipation, no nose bleed. Temperature, afternoon of admission, 102.6°. On the following day it was 101.4° in the morning, and 104.4° in the evening. It was subsequently taken every third hour throughout the entire course of the case.


DAY OF MONTH
DAY OF ILLNESS
April
May
June
CHILL 5 P.M.
CHILL (SLIGHT)
DIED AT 11 A.M.
PULSE
RESP.

The accompanying (abbreviated) chart shows the daily morning and evening temperature, and that the fever was a continuous one, with morning remissions and evening exacerbations. The average range was between 101° and 104°. The temperature only once reached 99° (in the morning), and but on one occasion (in the evening) 105.2°. The pulse was usually accelerated. The lowest noted was 84, and the highest 140. It showed wide and irregular variations. The number of respirations per minute were commonly in direct ratio to the body temperature.

Widal reaction and examination for plasmodia (Ghriskey) negative. (These examinations were made subsequently on alternate days for two weeks, with similar negative results.) Leucocyte count on admission, 5600; urine, faint albumin trace; microscopically (centrifuged specimen), but one hyaline cast noted; otherwise negative.. In arriving at a diagnosis the following ailments were considered: typhoid fever, æstivo-autumnal malarial fever, and acute miliary tuberculosis. The last was almost immediately suspected, and within a few days decided upon, but solely by exclusion, as the general features of the case were unlike those of other cases of acute miliary tuberculosis I had encountered. Here there certainly was as yet no lung involvement, and no signs of abdominal implication other than the presence of the enlarged palpable spleen. The marked splenic enlargement, indeed, was the only notable physical sign other than the persistently high temperature and debility. There were for many days no other noteworthy clinical symptoms, apart from occasional abdominal pain referable to the splenic region, and a tendency to cyanosis and continued blueness of the extremities when cold sponging was resorted to to reduce temperature. The patient's mind was clear and active, and she constantly reproached us for not ridding her of the fever, which she regarded as the only symptom of illness, that she might return to her home. Without other developments the patient's condition underwent little change for the greater part of the fifty-eight days. The lungs were carefully auscultated daily, with negative results, until about two weeks before death.

On May 14th (approximately the thirty-sixth day of the disease) two small glands were palpable in the left supraclavicular fossa. This was the first evident indication of dissemination of the tuberculous process. An ophthalmoscopic examination on this date (Dr. Van Pelt) showed congestion of retinæ of moderate degree limited to each nasal side above the disk, more marked in O. S.

Toward the end of May marked debility was present as a natural result of the continued fever. She took but little nourishment, although free from gastro-intestinal symptoms. At this time fine râles were evident now and then in both lungs. These, with vesiculo-bronchial breathing, were first noted posteriorly, her continued dorsal decubitus favoring stasis in the posterior surfaces of the lungs. On June 1st she had several spells of nausea and vomiting, and pain was complained of in the abdomen. Vomiting now recurred almost daily until death. She became delirious at night and had headache by day. It was noted on June 5th that the general body surface was markedly hyperæsthetic; jerking and twitching of the limbs had occurred the evening before, and she frequently now gave a sharp outcry. She had been slightly deaf for several days, and was now markedly so. On June 12th the bedside notes record: "Deafness less apparent; responds more readily when questioned, though commonly delirious. Apparently is free from unprovoked pain, but remonstrates when the abdomen is palpated. Frequent twitching of upper extremities, and these movements are accompanied by a harsh cephalic cry. Kernig's sign is absent. Tache cerebrale marked. Abdomen much distended. Tongue for first time dry and brown in color, sordes appearing. Pulse intermittent. Yesterday bright red circular area, about one inch in diameter, appeared on the back of the left hand. It had a distinct white border, and was covered with vesicles. The whole hand was swollen and somewhat red. To-day vesicles have united into one very large one, and similar spots have appeared on thumb and fingers. Cultures from the vesicles show staphylococci." On June 15th the notes state: Patient rigid for the past two days. Kernig's sign still absent. Drooping of right eyelid noted. Emaciation now becoming extreme. Area on hand has formed superficial slough. The patient's outcry is less shrill, and jerking of the limbs less marked. She is more or less comatose, constantly moans, and no longer responds rationally to questions. Marked weakness is apparent. Pulse continues intermittent. Patient died cyanosed on the morning of June 15th.

Clinical pathologist's (Dr. Ghriskey) report: No indications of kidney involvement until late in the case. Albumin and casts absent in the early period of the disease. Numerous blood inspections negative, save for a leucocytosis first noted June 12th. Several examinations of the erythrocytes were made, the last May 10th: 3,800,000. Hæmoglobin, estimated on several occasions early in the disease, 65 to 75 per cent. Leucocytes frequently estimated; counts ran between 5000 and 6000 until on June 12th, 14,800 (terminal infection). Malarial parasites, frequently examined for early in the case, always absent. During the first week the blood was also drawn from the spleen for this examination. Unfortunately tubercle bacilli were not examined for in this specimen. Cultures from this (for typhoid) were made; result negative. In the middle period of the disease 4 c.c. of blood from a vein was diluted, centrifuged, and examined for tubercle bacilli; result negative. Several sputum examinations were made the last of May and early in June and no tubercle bacilli found. Diazo reaction examination on several occasions was negative at first, but positive on May 7th. Cultures from vesicles on hand and from meninges of brain showed staphylococci. Other cultures at post-mortem negative.

Report of the necropsy and gross and microscopic examination of specimens by the Episcopal Hospital pathologist, Dr. W. E. Robertson, June 15, 1900: The body is that of a slender young woman. Rigor mortis absent. A large bulla noted on dorsum of left hand.

Thoracic Cavity. Lungs and heart taken out together. Heart presented nothing abnormal. Lungs the seat of diffused, very small miliary tubercles. No consolidation. Lungs crepitated throughout. Moderate pleural adhesion on both sides. Several medium-sized lymph glands in left supraclavicular fossa, enlarged and caseated, and resting upon subclavian artery.

Abdomen. Slight amount of fluid and some injection of intestines. No tubercles on mesentery or peritoneum. Intestines and stomach were examined throughout. No typhoidal or tubercular lesions. A few shallow ulcers or erosions in the ascending colon. Liver slightly fatty but firm, and presented fairly numerous minute tubercles through it.

No gallstones. Duct patulous. Kidney capsules stripped with ease. Section showed cloudy swelling, apparent slight interstitial change. Few small miliary tubercles evident near capsule.

The most noteworthy feature of the examination was the spleen. This was about four times the normal size. It was studded on its peritoneal coat with elevated yellow tubercles the size of a large pea, and surrounded by an inflammatory zone. "On section the whole organ was found to be a mass of tubercles, varying in size from a pin-point to 4 mm. in diameter. These, to about the extent of one-half of the spleen, had advanced to complete caseation, converting this part of the gland into a confluent tubercular mass, in which, while the outline of some of the tubercles was still apparent, in the greater part there was merely evident a most marked cheesy necrosis. Such a condition was found nowhere outside the spleen."

Pancreas normal. Bladder distended. Wall thick-looking, and vessels in it turgescent. Urine blood-tinged. Wide-spread submucous extravasation of blood. "Blood could be neither wiped nor washed off. There was nothing to explain this high grade of hyperæmia, which resembled that met with in some cases of paraplegia, or where the circulation through the inferior cava is interfered with. Such a condition is sometimes seen in hemorrhagic diseases, such as scurvy, and it is possible that in this case the intensity of the infection may have induced it as it did the blood extravasations in the kidney and spleen."

Brain. Dura bulged on removing skullcap. Large amount of fluid escaped when it was cut. It was quite adherent over region of Pacchionian bodies. In this region, too, a slight amount of puriform material was found, and also in a few other places scattered irregularly over the cortex, these latter in the subarachnoid space apparently. Adhesions in fissures at base. Miliary tubercles along small vessels in fissure of Sylvius. Cord not removed.

Histological examination of liver, kidneys, and spleen.

Liver. Parenchymatous degeneration. Slight increase of perilobular connective tissue, and a tendency to multiplication of bile capillaries. Numerous microscopic miliary tubercles, the large majority being in an early stage, only an occasional one presenting some cheesy necrosis. There was no confluence of tubercles.

Kidney. Slight diffuse parenchymatous degeneration. Numerous microscopic miliary tubercles, for the most part early, though there were a few which were decidedly degenerated in their centres, and here and there some coalescence had taken place, so that the mass was visible to the naked eye, though very small.

Spleen presented the most pronounced tuberculous condition far more than any other organ in the body. In addition to countless miliary tubercles in a comparatively early stage, these being far more numerous than found in the other organs, were confluent tubercles, many of them small, others very large, and all in an advanced stage of necrosis, about one-half of the organ being appropriated by this conglomerate tubercle mass. Both kidneys and spleen were much congested and extravasations of blood were common, especially in the spleen.

There is an interesting similarity between the case of the writer and that of Scharold before mentioned. Like Scharold's, my patient became acutely ill, but evidently having greater resisting power, the manifestations of general infection were much less overwhelming, and the duration of the ailment considerably more extended. Scharold's case died on the seventeenth day, mine on the sixty-eighth. As in Scharold's case, enlargement of the spleen was noticeable early. This, with other acute manifestations, had naturally caused the attendant prior to admission to the hospital to regard the ailment as typhoid fever, and the patient was admitted to the hospital with this diagnosis. Unlike Scharold's case,[1] symptoms and physical signs suggestive of pulmonary involvement were totally absent, and their continued absence, with a similar dearth of indications of localization of the tuberculous process elsewhere than in the spleen, was regarded as most singular. As detailed in the history, other than the splenic enlargement and the continuous and rather high temperature, there was a curious absence of symptoms through the greater part of the course of the case. The splenic enlargement reached its maximum rather early, and showed no increase after the third week of illness. The spleen was not notably sensitive to pressure until late in the disease. Unlike Scharold's case (Scharold gives only the macroscopic appearances of the presumed uninvolved organs) the tubercular process had generalized when death occurred. Miliary tubercles were then evident in the brain, lungs, liver, and kidneys. Those in the lungs, though disseminated, were recent and minute, and there were no indications of consolidation. There were also but few tubercles manifest macroscopically in the liver and kidneys, and none existed in the peritoneum or in the gastro-intestinal tract, uterine appendages, or bladder. The process was so extensive and advanced in the spleen, and so extraordinarily out of proportion to that encountered elsewhere, that Dr. Robertson, though unaware of the history, at once remarked the case was evidently one of primary miliary tuberculosis of this organ, and this, I believe, we must so regard it.

Infection in this case apparently arose through the consumptive the patient was nursing. It must, of course, have occurred early in her contact with him, as symptoms appeared acutely about the middle of the second week. She had gone to the case for humanitarian reasons, and, contrary to the advice of her friends, a week after the onset of a mild attack of supposed grippe. Though this had not confined her to the house, she stated she still felt weak. Immediately prior to this she had left a convalescent typhoid patient, in which case she had been the sole nurse, and had continued with it for two months. She was then ill prepared to undertake the arduous duties which devolved upon her in nursing the consumptive. As before remarked, this patient's rooms were damp and cold, and the nurse was constantly in attendance, lost much sleep, and was poorly fed.

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[1] I was then unaware of the case of Scharold. My attention was drawn to it subsequently by Dr. W. E. Robertson.

NOTE UPON A CASE OF CARDIA DUPLEX IN A TURKEY.

BY ALLEN J. SMITH, M.D.,
OF GALVESTON, TEXAS.

(From the Pathological Laboratory, University of Texas, No. 5, 1901.)

THE specimen upon which this note is based came into the writer's hands in so unfortunately marred a state that many of its interesting features could only be surmised, and for this reason it has seemed advisable to record, without any extended discussion (which under the circumstances could have led to little at best), the occurrence of the anomaly and to briefly describe the condition as far as definitely shown in the specimen.

Several months ago two of the students of the second-year class in medicine in this institution—Messrs. Ferguson and Reifel—brought the writer two hearts which they stated had on the previous day been taken from a turkey in its preparation for the day's meal. The housekeeper in removing the viscera first dragged out the smaller of the two organs, not having recognized its double, and remarked its small size; and in a moment, feeling the larger organ, dragged it forth in turn. Realizing that the condition was a very unusual one, she kept the two specimens, and on the return of the students to their rooms the same evening she brought the hearts to them as a curiosity. In the meantime the turkey had been cooked and eaten. As far as could be learned, however, there was noted nothing in the appearance of the fowl suggestive of any abnormality or disease, and it was said to have been a female turkey of ordinary size.

On examining the specimens, both with the pericardial sac gone and the vessels at the base of each heart torn away (the veins almost entirely torn out of the auricular walls, the arteries persisting for a short distance beyond the cardiac walls), it was evident from the existence of a flattened surface on each where the two organs had been in apposition, and from the correspondence of auricular tears, that the two were originally continuous, one right auricle serving for both and uniting the two organs at the base, as indicated in the diagrams. The larger organ weighed 13.5 grammes, the smaller 4 grammes. The measurements of the larger were as follows: circumference at base, 8 centimetres; length of left ventricle (outside measurement), 4.5 centimetres; thickness of the wall of the left ventricle, 0.8 centimetre; thickness of the wall of the right ventricle, 0.2 centimetre. The measurements of the small organ were as follows: circumference of base, 5 centimetres; external length of left ventricle, 3 centimetres; thickness of wall of left ventricle, 0.4 centimetre; thickness of wall of right ventricle, 0.15 centimetre. The volume and weight proportions are thus seen to be nearly uniform, except that the wall of the left ventricle of the larger heart is proportionately thicker than that of the smaller, and, on the contrary, the wall of the right ventricle of the smaller is proportionately thicker than that of the larger organ.

In the accompanying diagrams the hearts have been drawn as if still united, the first and second figures representing fairly the external appearance of the specimen from ventral and dorsal aspects, the third and fourth figures being merely diagrammatic representations of the interior arrangements of each heart separately. In Fig. 1, a ventral view of the two hearts, the various parts are indicated by letters as follows: *R. V.*, right ventricle of major heart; *A.R.V.*, accessory right ventricle (or right ventricle of minor heart); *L.V.*, left ventricle of major heart; *A.L.V.*, accessory left ventricle; *S.*, septum; *R.A.* and *A.R.A.*, the fused right auricles of the two organs; *L.A.*, left auricle (of major heart only); *P.*, pulmonary artery of major heart; *A.P.A.*, accessory pulmonary artery; *A.*, aorta with traces of three branches; *A.P.*, accessory aorta with two branches. Fig. 2 represents the dorsal view of the same. The letters correspond, and in addition *P.V.* indicates a pulmonary vein entering the left auricle, and *V.C.* one of the venæ cavæ entering the right auricle. The auricular wall was so badly torn that the writer could not be certain of any of the veins except this

FIG. 1.

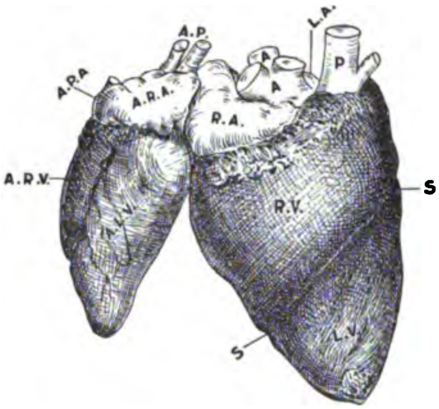


FIG. 2

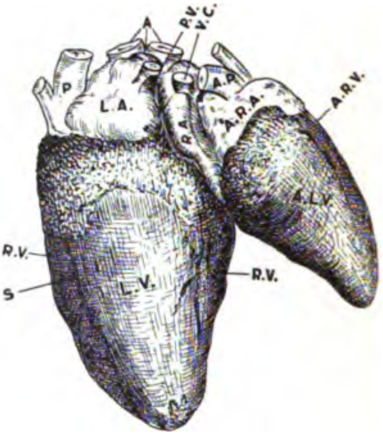
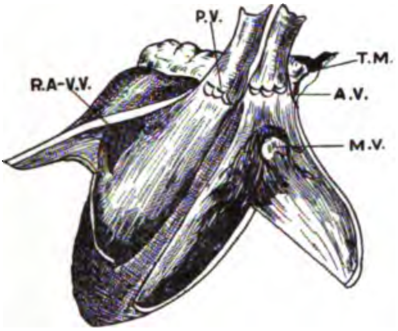


FIG. 1.—Ventral view. *L. V.* Left ventricle. *S.* Interventricular septum. *R. V.* Right ventricle. *A. L. V.* Left ventricle of small organ (accessory left ventricle). *A. R. V.* Accessory right ventricle. *R. A.* and *A. R. A.* Fused right auricles of both organs. *L. A.* Left auricle of large organ. *A.* Aorta from large heart. *A. P.* Aorta from small heart. *P.* Pulmonary artery of large heart. *A. P. A.* Pulmonary artery from small heart.

FIG. 2.—Dorsal view. Letters as above. *P. V.* Pulmonary vein entering left auricle. *V. C.* Vena cava entering fused right auricles.

one pulmonary vein entering the left auricle in its upper portion back of the aorta and close to the interauricular septum; otherwise this part of the wall was apparently without any entering vessels. An irregular hole in the wall of the fused right auricle at *V.C.* (Fig. 2) and another

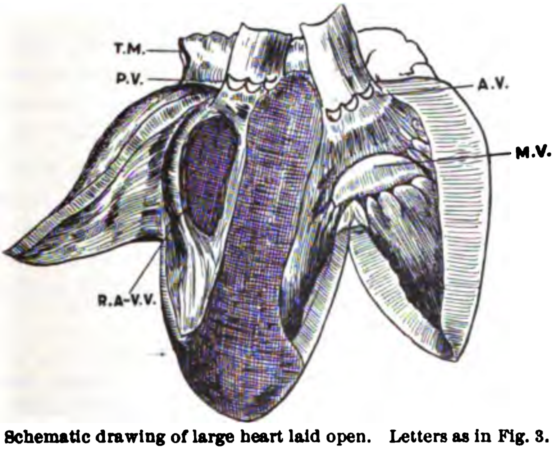
FIG. 3.



Schematic drawing of small heart laid open. *A.V.* Aortic valve. *P. V.* Pulmonary valve. *M. V.* Mitral valve. *R. A-V. V.* Right auriculo-ventricular valve. *T. M.* Torn margin of separated right auricle.

lying slightly ventral to it were accepted tentatively as the points of entrance of the venæ cavæ, and probably of the other veins entering the right auricle. Fig. 3 represents the small heart laid open. The letters indicate respectively: *A.V.*, aortic valve; *M.V.*, mitral valve; *P.V.*, pulmonary valve; *R.A-V.V.*, right auriculo-ventricular valve; *T.M.*, torn margin of fused right auricle rent in removal of the specimen. Fig. 4 represents a similar view of the interior of the

FIG. 4.



Schematic drawing of large heart laid open. Letters as in Fig. 3.

larger organ, and the lettering corresponds with that of the preceding figure.

It is evident that the essential anomaly, aside from the undoubted vascular irregularities lost, was due to a fusion of the two right auricles of otherwise separate double hearts in one individual, with absence of a left auricle in the smaller of the two organs. The course of the blood stream, then, must have been from the systemic veins into the united right auricles; thence through the three openings, easily determined upon exposure of the cardiac interiors, into the two ventricles of the small organ and right ventricle of the larger heart (*R.A-V.V.* and *M.V.* of Fig. 3, and *R.A-V.V.* of Fig. 4). The blood from the two right ventricles probably went to the lung; but it is quite possible that some of the venous blood passing through *A.V.* (Fig. 3) may have been driven from the left ventricle of the small heart into the arterial system. Returning from the lung, the blood probably found its way regularly through the pulmonary vein into the left auricle, and thence, passing through the mitral valve into the left ventricle of the large organ and out through the aortic opening, into the general arterial system. A curious arrangement is to be seen in the construction of the right auriculo-ventricular valve in each organ (*R.A-V.V.*). Instead of the usual three fibrous sheets met in the structure of the tricuspid valve, in each of these hearts such cusps are replaced by a comparatively thick, fleshy fold of the wall of the ventricle, attached above to the auriculo-ventricular septum or close to it, and closely adapting itself against the interventricular septum when closing the opening. In the smaller heart, as represented in Fig. 3, a small fibromuscular band or sheet attached to the auriculo-ventricular and interventricular septa serves to some slight extent as an opposing sheet to this muscular valve. A proportionately smaller, less distinct structure of the same kind is seen as well in the larger organ. In each heart the inner surface of the right ventricle was peculiarly void of the usual pectinate muscles and papillary muscles, and was quite smooth. In the absence of other data the writer prefers to forego discussion and comparison with the occasional similar findings of other observers;[1] but believes the extreme rarity of the anomaly and its functional importance make it worthy of at least this passing notice.

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[1] Gould and Pyle, in their work upon anomalies and medical curiosities, make the following statement: "Duplication of the heart, notwithstanding the number of cases reported, has been admitted with the greatest reserve by Goeffroy-St. Hilaire, and by a number of authors. Among the celebrated anatomists who describe duplex heart are Littre, Meckel, Collomb, Panum, Behr, Paullini, Rhodius, Winslow, and Zacutus Lusitanus. The 'Ephemerides' cites an instance of triple heart, and Johnston has seen a triple heart in a goose."

REVIEWS.

A PRACTICAL TREATISE ON DISEASES OF THE SKIN. FOR THE USE OF STUDENTS AND PRACTITIONERS. By JAMES NEVINS HYDE, A.M., M D., Professor of Dermatology and Venereal Diseases in Rush Medical College, Chicago. New (sixth) edition. In one octavo volume of 832 pages, with 107 engravings and 27 full-page plates, 9 of which are colored. Philadelphia and New York: Lea Brothers & Co., 1901.

NEW editions of this well-known treatise continue to appear with a frequency and regularity that must be extremely gratifying to author and publishers alike; but little more than a year has passed since the appearance of the fifth edition, and already it has been found necessary to issue a new one. Owing to the brief period which has elapsed since the publication of the last edition, no very great or important additions are to be found in the present one; but that the author has found it necessary to make a considerable number of changes to bring his treatise up to a date is evidence not only of his care in revision, but of the zeal and industry with which this department of medicine is being cultivated at the present time. A considerable number of sections have been partly or entirely rewritten, and the definitions in small type, which in previous editions headed the sections, have been omitted, the latter being, in our opinion, a decided improvement in the arrangement of the text.

We regret to note that the affection first described by Leloir under the name conglomerative pustular perifolliculitis is still placed among the inflammations instead of among the parasitic diseases, where we believe it properly belongs. We are quite convinced that there is ample evidence to prove that it is a trichophytic folliculitis, and should, therefore, be considered among the diseases due to the ringworm fungus.

The author is apparently more inclined than formerly, along with many other authorities, to look upon zoster, in some cases at least, as an infection—a view to which some of the features of the disease, such as the infrequency of second attacks, its occurrence in epidemics, and its proven contagiousness in some instances, lend much probability.

While admitting the presence of the microbacillus of Sabouraud and Unna in the lesions of acne, a very conservative attitude is maintained as to the etiological importance of this micro organism—a conservatism which is only to be commended.

The section upon blastomycetic dermatitis, a subject with which the author's name is so intimately associated, has been renamed blastomycosis of the skin, a much more appropriate term than that formerly employed; and considerable new matter has been added based upon further studies of the malady. The brilliant results obtained from full doses of potassium iodide, as first suggested by Bevan in some of his cases, lead to a more emphatic recommendation of this drug in the treatment of the disease.

This new edition is a worthy successor of those which have preceded it, and the student, the practitioner, and the specialist may consult its pages with the assurance of finding reliable information concerning the subjects pertaining to dermatology. M. B. H.

PULMONARY CONSUMPTION, PNEUMONIA, AND ALLIED DISEASES OF THE LUNGS. Their Etiology, Pathology, and Treatment, with a Chapter on Physical Diagnosis. Illustrated. By THOMAS J. MAYS, A.M., M.D. New York: E. B. Treat & Co.

DR. THOMAS J. MAYS, Professor of Diseases of the Chest in the Philadelphia Polyclinic, and Visiting Physician to the Rush Hospital for Consumptives, is so well known as a writer and lecturer on diseases of the chest, and has had such wide experience in the study of these maladies, both here and in the large consumptive hospitals of England and the Continent, that his utterances on the subject elicit more than ordinary interest.

The book is as instructive as it is exhaustive, for its author seems during his studies abroad to have possessed himself of the German habit of tracing every subject to its remotest origin, and reasons *à priori* so convincingly that you cannot but feel with him say, for example, that the popular germ theory of the origin of consumption is based upon incomplete premises, and that it is only necessary to go a little further back in order to be convinced of two fundamental facts, namely, that phthisis pulmonalis, or so-called tuberculous phthisis, does not have its origin in the lungs, and that instead of its being due to the importation into the system of the bacilli of tuberculosis, as is popularly believed, these, on the contrary, are the result rather than the cause of the disease—incidents in the development of the malady—not making their appearance until it is well advanced rather than the prime factor in its creation.

This conclusion in itself is sufficiently startling—we might say gratifying—for these germ-ridden days, when pathological and bacteriological alarmists teach that we must not kiss our children "except on the cheek" for fear of receiving or transmitting disease; that we must not breathe the same air with the poor and neglected for fear, not of moral, as in the olden times, but of physical pollution; that we must not drink from the same cup, or use the same spoon, or eat from the same plate; and that we must not even shake consumptives' hands unless they have been previously boiled in the ubiquitous sterilized or bichloride water of the germ-mad theorist.

Thus in these bacteria-dementia days, when almost every medical publication teaches with monotonous iteration that there are bacilli in stones, spirilli in the running brooks, and streptococci in everything, it is, indeed, a delight to learn from such a careful observer as Dr. Mays that although tuberculosis may perhaps be conveyed to man by inoculating and feeding him with tuberculous matter, yet there is nothing to prove that tuberculosis is in any way contagious, experience here being widely at variance with theory. It would seem, too, that none of the great consumption specialists believe in the contagiousness of consumption, because there is nothing to actually show that the disease can be transmitted, as the commonly recognized contagious diseases are, from one person to another.

The chapters on the therapeutics of consumption are also of supreme importance because of the extensive experience of their author in the treatment of consumption in conjunction with other means by the injection of silver nitrate over the course of the pneumogastric nerve in the neck.

Such treatment as this is logically indicated by the theory of the origin of the disease being in the nervous system.

This method has not been adopted, as has been misunderstood, on the supposition that there is anything *specifically* valuable or curative in silver nitrate over any other equally mild and convenient irritant, for this drug has been selected by Dr. Mays in preference to others merely because of the facility with which it can be used, and also because of its active counter-irritating effect when injected over the course of the nerve that controls respiration.

It is the inflammation rather than the drug *per se* that causes such marvellous control of otherwise uncontrollable cough. Any other drug capable of setting up a similar inflammatory process would be equally effective. Most of us are familiar with the effect of tincture of iodine painted over the neck in controlling the paroxysms of whooping-cough. Any other equally counter-irritating drug would have the same effect, and it is this same stimulation transmitted in some unknown way, perhaps to the pneumogastric, that increases the appetite, arouses assimilation, and enables the system to regain its metabolistic equilibrium, so that as a rule patients gain flesh rapidly while under its control, and ultimately lose the cough habit or the necessity for cough.

Another exceedingly interesting part of this volume is the chapter on the Clinical View of Acute Pneumonia from the Stand-point of Nervous Development. This is a well-reasoned and lucid arrangement of the facts in the development of the disorder from its ultimate beginning as an uncomplicated neurosis to its final manifestation, as inflammation of the lungs. And, as its author says, " there is no other theory points out so forcibly that the fundamental position of pneumonia naturally belongs to the family of nervous diseases." Disease of the vagus, for example, is known to be a frequent cause of disease of the lungs.

Therapeutics of Pulmonary Consumption and of Acute Pneumonia, and the chapters on Acute Bronchitis, Chronic Bronchitis, Asthma, and Pleurisy, respectively, are full of wise suggestions, shrewd observations, and valuable practical hints. In the perusal the reader is convinced that he is being taught about all that there is to be taught of practical value, and that by mastering the use of the armamentarium suggested he is in a position to grapple intelligently with these patience-exhausting disorders.

In conclusion, we feel the profession owes a debt of gratitude to Dr. Mays, if for nothing else, because of his synopsis of the history of the mistaken attempts that have been made in various countries to prevent the spread of consumption by isolation of its victims, based as they have been on the false theory of its being contagious, and especially of the Draconian measures adopted in Naples and other parts of Italy.

M. W.

OPERATIVE AND PRACTICAL SURGERY. FOR THE USE OF STUDENTS AND PRACTITIONERS. By THOMAS CARWARDINE, M.D. (Lond.), F.R.C.S., Assistant Surgeon, Bristol Royal Infirmary. With 550 illustrations, most of which are original drawings by the author. Pp. 630. Bristol: John Wright & Co. London: Simpkin, Marshall, Hamilton, Kent & Co., Ltd., 1900.

A MOST practical and useful volume, in attractive print, admirably supplemented by a generous supply of cuts, which, though at times artistically crude, illustrate the text with conspicuous clearness. The author truly characterizes his volume in its preface when he says: "It deals with the art of surgery in its everyday application, and its practical bearing has necessitated considerable attention to literary perspective and light and shade, the outcome of experience."

It well achieves its aim as a concise yet comprehensive presentation of surgical examination, diagnosis, and procedure. It speaks with the authority and directness of wide practical experience, and it refers not only to modern but to the most recent—foreign and American as well as English—devices and methods.

It is divided into ten sections, and each section into chapters. The preliminary section is in itself a most useful contribution, dealing with antisepsis, surgical bacteriology, and, finally, with surgical physical examination, diagnosis, and case-taking. The need for such a chapter has long existed, and it should be welcomed by undergraduate students and hospital internes.

In the second section, devoted to bandaging, dislocations, and fractures, there is excellent detailed practical instruction. It is to be regretted that it omits to illustrate methods of suspension and of horizontal support for the application of fixed dressings to the spine, chest, or hips. In treating of Colles' fracture there is not only insufficient stress upon the necessity of thoroughly reducing posterior upward deformity of the lower fragment, but there is no mention of the necessity to institute flexion of the wrist for the preservation of reduction—be the method of splinting what it may. Furthermore, the depression for the ball of the thumb in the case of the splint, advocated by the author, is so slight that it, like the Bond splint, unless properly padded, invites posterior deformity because it extends instead of flexing the wrist. Perfect results can be achieved with these splints, but they must be so highly padded under the distal end of the proximal fragment that the oblique bar can only be grasped by the fingers on strong flexion of the wrist.

General operations are described in the third section, with a generous supply of diagrams of sutures, knots, and incisions. The surgery of the head, neck, face, and mouth occupies the fourth section; that of the chest, including the breast, the fifth. The sixth is devoted to genito-urinary surgery, gynecological as well as male. It includes the latest methods of examining and operating upon the prostate, uterus, kidneys, ureter, and bladder.

The seventh, eighth, and ninth sections deal with the abdominal cavity and organs, the mid-gut and the hind-gut. These chapters brilliantly and concisely rehearse the operative triumphs of the hour in abdominal surgery, both in method and device. The book is completed by the tenth section, devoted to the teeth, nose, larynx, ear, and eye.

J. M. S.

The Blood and Its Diseases. Clinical Pathology of the Blood. A Treatise on the General Principles and Special Applications of Hæmatology. By James Ewing, M.D., Professor of Pathology in Cornell University Medical College, New York City. In one octavo volume of 432 pages, with 28 engravings and 14 full-page plates in colors. Philadelphia and New York: Lea Brothers & Co., 1901.

This the second American text-book on the blood is sure to meet with deserved success. It differs in many respects from Cabot's book upon the blood, as it contains comparatively few statistical tables on the results of blood examinations in special diseases. One of the main objects for the preparation of the work is the reference to the later contributions to the pathology of the blood and the blood-forming organs, research upon which has been made in Germany and other countries, and the literature in reference to which is often difficult to secure.

Dr. Ewing is evidently a man of firm belief in the best method of work, and does not hesitate to express his convictions in very decided terms upon subjects upon which there may be room for some difference of opinion. In the count of leucocytes (page 36) he prefers to use the Zappert chamber and estimate the white cells with the red corpuscles. This, in the writer's experience, sometimes makes a variation of several thousand from the separate estimate of leucocytes. It is, however, a very rapid method. Under the apparatus devised for the estimate of the hæmoglobin (page 38), Gowers', von Fleischl's, Mieschner's modification and Oliver's apparatus are described. The last-named is considered a satisfactory instrument, but because of its price is not available for general use. The writer has used the Oliver instrument for some time, and found its estimate tallied well with the von Fleischl apparatus, but considers it a very impracticable instrument for ordinary use. There is no mention whatever of Dare's hæmoglobinometer, which has several advantages over those previously mentioned, and which seems, for clinical purposes at least, to be sufficiently accurate. Wright's tubes for the estimate of the coagulability of the blood are mentioned but to be condemned (page 53). Emphasis is placed upon the difference between the polychromatophilic degeneration (Ehrlich) and the granular degeneration of red cells (Grawitz), (page 86).

The reviewer has read the article upon pernicious anæmia, anæmia infantum, pseudoleukæmia, and malaria with great pleasure and profit. The pathological information contained in the article adds much to one's understanding of the diseases. Crisp, concise statements are made which show that Dr. Ewing believes in being didactic. Thus in reference to pernicious anæmia, "unless 33 per cent. of the cells (red) are distinctly over-sized the diagnosis of pernicious anæmia should be made with reserve." On page 186 he states that his conception of the pathogenesis of pernicious anæmia is that of a defective hæmatogenesis in which megaloblastic degeneration of the marrow is the pathognomonic tissue lesion, and excessive hæmatolysis a consequent result. This view is in opposition to that of Hunter, Delepine, Coleman, and many other investigators, but seems, however, to have a good pathological basis.

Ewing's position on anæmia infantum (v. Jaksch) is based upon the pathology of the disease. He is not inclined to consider it a leukæmia, a view held by some American writers, because he has failed to find leukæmic infiltration post-mortem. He feels, however, that many of the cases reported as anæmia pseudoleukæmia infantum are either pernicious anæmia or true leukæmia; the pathological changes in his own case were in the groups of mitotic red cells and leucocytes in the hepatic capillaries, showing that the liver had resumed or retained its faculty of blood-cell formation.

The chapter on malaria occupies thirty-three pages, and it is very good. Some of the terse conclusions he reaches are as follows: "In all well-marked initial attacks of malaria or malarial fever the parasites can be found in the blood if examined within eighteen hours after the chill" (page 101). "Fatal acute malaria does not exist without the presence of parasites in the blood, or at least at some time during the paroxysm." Nocht's method is recommended as the best and most satisfactory for staining the parasites.

The book contains some thirty illustrations and fourteen colored plates, the latter being drawn by Dr. Ewing. They represent high amplifications of the blood, and strike one, therefore, as being rather crude. In most instances, however, the color is good, though Plates VIII. and IX. represent eosin and methylene-blue as much as triple staining. The malaria plates are very good. In one place (page 83) is a printer's error, for which worn type is responsible. In the index, in looking up Nocht's method, you are referred to page 370. This should be 380. Neither in the index nor in the text do you find any reference to splenic anæmia as a special clinical variety of anæmia. In the reviewer's opinion it is the most satisfying book upon the blood of which he knows. The large amount of bibliography which it contains will be of much assistance to workers in similar fields. J. A. S.

INTRODUCTION TO THE STUDY OF MEDICINE. By G. H. ROGER, Professor Extraordinary in the Faculty of Medicine of Paris. Authorized translation, by M. S. GABRIEL, M.D. New York: D. Appleton & Co., 1901.

THE difficulties encountered by the first-year medical student in knowing with what subjects to begin, what books to read, and especially in scientific nomenclature, have led the University of Paris to establish a course of lectures introductory to the study of medicine. The task of their preparation and delivery has been entrusted to Professor Roger, who has approached the subject in the broadest manner and has attained a correspondingly successful result.

In many ways, however, the title of this volume is misleading. The book, as a whole, while admirably fulfilling its avowed purpose, will appeal quite as strongly to the graduate as to the student. It is practically a summary of medical progress, with special reference to the causation of disease and to the correlation between pathological morphology and physiology.

A discussion of the causation of the various features of disease is followed naturally by the means at hand of determining the character of each case as it is presented, constituting diagnosis, and by the rational means of combating the morbid process or therapeutics.

The task before Professor Roger has been one of which we may well appreciate the difficulties, and the temptation to diverge from his subject and to discuss at length various topics of special interest must have been very great. To the practitioner the book will be a concise statement of what is vital in pathology, semeiology, diagnosis, and therapeutics, brought up to the level of the latest discussions upon these subjects, and so arranged as to give the reader a glimpse of the increasing interdependence of all branches of science. Professor Roger emphasizes the importance of the purely clinical methods of diagnosis as opposed to those of the clinical laboratory. To quote from the preface: "No one is more firmly convinced than myself of the usefulness of experimental pathology. Nevertheless, at the bedside the physician can do no better than to depend upon clinical procedure. Only in quite rare instances will he be obliged to resort to more delicate methods of investigation. I cannot admit abdication of clinical methods of investigation before the rising tide of bacteriology." However, the necessity of laboratory diagnosis is unconsciously emphasized in many places, and the book, while properly dwelling upon the importance of clinical methods, cannot but impress one with the increasing aid to medicine that is given by the modern instruments of precision.

The book can be heartily recommended, especially to students of medicine, for whom it was ostensibly written, but cannot fail to be of value to those older members of the profession who find aid and profit in the periodical summaries of medical progress, whose number is so increasing at the present time. The translation is, in general, all that could be asked, and the presswork and binding impress one as being above the average. J. D. S.

STUDIES IN HUMAN AND COMPARATIVE PATHOLOGY. By WOODS HUTCHINSON, A.M., M.D. Edited by EDWARD BLAKE, M.D. Henry J. Glaisher, 1901.

THE study of comparative pathology has but recently attracted the attention which it deserves. To the zoölogist, to the pathologist, and to the clinician it has a fascination as well as a large amount of practical value. The book which forms the text of this review presents the subject in an extremely attractive manner, avoiding, on the one hand, the too elaborate consideration of the pathological conditions discussed, and, on the other hand, going sufficiently into detail to make the book of interest to those fully versed in pathology. As it stands, the book is more useful to the practitioner of medicine than would be a more comprehensive text-book upon the same subject. It is full of suggestive thoughts bearing upon the pathology of human disease, and its perusal cannot fail to interest as well as broaden the views of the reader. The main argument which the author constantly brings up to explain pathological lesions in the human being is the lessened resistance and greater instability of parts latest developed in the scale of evolution and in those tending to return to the ancestral type. It might be said that this argument is at times rather overworked. However, it undoubtedly plays an important part in human pathology, and it is well that a clear exposition of a believer in this factor of disease should be heard. One of the most interesting chapters in the book is that upon the deformities of the chest in the light of its ancestry and growth, in which the author shows the fallacy of the statement that in pulmonary tuberculosis the antero-posterior diameter of the chest is diminished. He explains the fact that the chest of tuberculous patients is described as flat by stating that the appearance is due to the carrying forward of the shoulders rather than to any change in the shape of the chest itself. His views in regard to the genesis of tumors are very well worth reading, although some of them can hardly be considered as proven or tenable. Instability is here also looked upon as an extremely important element in the causation of tumor formation.

While this book cannot be regarded as thoroughly scientific, it is one that will well repay perusal by physician, surgeon, and pathologist. To the busy practitioner who has not time to read the exhaustive treatises upon comparative pathology, or who could not fully comprehend them were he to take the time to do so, a perusal of the book will not only interest him, but will broaden his views of human disease processes.

F. A. P.

SAUNDERS' MEDICAL HAND ATLASES.

ATLAS AND EPITOME OF LABOR AND OPERATIVE OBSTETRICS. By DR. OSKAR SCHAEFFER, Privatdocent in Obstetrics and Gynecology in the University of Heidelberg. Edited by DR. J. CLIFTON EDGAR, Professor of Obstetrics and Clinical Midwifery in the Cornell University Medical College; Attending Physician to the Mothers' and Babies' Hospital and the New York Maternity. With 14 lithographic plates in colors, and 139 other illustrations. 12mo. Pp. 111. Philadelphia and London: W. B. Saunders & Co., 1901.

ANATOMICAL ATLAS OF OBSTETRICS, WITH SPECIAL REFERENCE TO DIAGNOSIS AND TREATMENT.

THESE two volumes have been very successful in Germany, the first reaching the fifth and the second a second edition. As the name indicates, they are, briefly, illustrated books, describing labor, and obstetric operations, and giving the anatomy of labor, with illustrations showing many common pathological conditions pertaining to parturition.

The text is based upon the teaching and practice of obstetrics which obtains in Germany. In describing the mechanism of labor two positions are recognized in each presentation, with variations caused by abnormalities in the factors of labor. As is customary with German writers, many proper names are used to describe methods of treatment and clinical phenomena. German methods are given the preference in operations and in selecting modes of treatment. The text is brief, concise, and gives a very successful epitome of obstetric practice. Some forms of treatment differ considerably from those employed in this country. While the description of eclampsia is clear and comprehensive, its treatment receives brief consideration. Puerperal septic infection is fully described, but the operative treatment of this condition is scarcely mentioned. The mercurial treatment and other methods addressed to the constitution of the patient are described.

The text is valuable for the amount of scientific information compressed into a small space. The text is most valuable in the description of the anatomy of the genital tract and the pathology of the complications occurring in obstetric practice. It has been made clear and very readable by Dr. Edgar's interesting translation.

The illustrations are numerous, and some of them original and novel. Many colored plates are inserted, usually to advantage, although in some the colors are so dark as not to be entirely successful. The diagrammatic plates are clear and illustrate the subject well.

The book is of very convenient size, and will be found useful by students and by practitioners who wish to review briefly an obstetric topic. The book is especially valuable in studying the diagnosis and pathology of obstetric conditions. E. P. D.

ATLAS AND EPITOME OF OPHTHALMOSCOPY AND OPHTHALMOSCOPIC DIAGNOSIS. By PROF. DR. O. HAAB, Director of the Eye Clinic in Zurich. From the third revised and enlarged German edition. Edited by GEORGE E. DE SCHWEINITZ, Professor of Ophthalmology, Jefferson Medical College, Philadelphia. With 152 colored lithographic illustrations and 85 pages of text. Philadelphia and London: W. B. Saunders & Co., 1901.

COMPARISON of this the latest edition of Haab's well-known *Atlas of Ophthalmoscopy* with the first two editions is most favorable. In it we find that in addition to the vast number of most valuable sketches which previously appeared in the work, the author has given us several excellent pictures of some of the rarer forms of ophthalmoscopic representation of local disturbance and general disorder. Among these may be mentioned glioma, leukæmia (this latter sketch being particularly good), traumatic macular disease, hyaline bodies in the vitreous layer of the choroid, and the most peculiar type of senile pigmentation of the retina. To these the editor has added two exquisitely painted sketches, showing angiod streaks in the retina, with one giving the ophthalmoscopic appearances that are seen in arterio-sclerosis.

The text is arranged in a logical order, and reads both well and easily. Careful examination of it shows that it is replete with interesting matter that is of value not only to the special student in ophthalmology, but to practitioners who are well advanced in ophthalmic practice. In a number of instances instructive colored drawings, with appropriate text that illustrates and describes the microscopic appearances of some of the related ocular lesions, have been usefully inserted.

Both the author and the editor are to be congratulated upon the improved appearance of their past efforts and the increased usefulness of their conjoined undertaking. C. A. O.

TEXT-BOOK OF THE PRACTICE OF MEDICINE. By DR. HERMANN EICHHORST. Authorized translation from the German. Edited by AUGUSTUS A. ESHNER, M.D. Two volumes. Philadelphia and London: W. B. Saunders & Co., 1901.

THE original Eichhorst's *Practice of Medicine* is so well known as a standard text-book of value that no extensive notice of it is required.

The translator has performed his office well, not only in the actual rendering of the work into English, but also in judiciously adding an occasional note bringing the matter considered in the text up to date. The note on the absurdly short section on diseases of the pancreas saves the discussion of diseases of this organ from being absolutely useless. In certain places it seems to the reviewer that other notes could have been added with advantage. For instance, in regard to the treatment of acute pleurisy nothing is said in relation to the diet which is calculated to aid the absorption of the effused fluid, while under operative treatment only one form of apparatus is described, the aspirator not being mentioned, and the practical details of this minor operation, which are ordinarily given in full, are entirely omitted. Also, under typhoid fever there is little mention of what is certainly an important and well-recognized method of treatment, the use of the systematic cold bath. Whether or not the author believes in this method of treatment it certainly deserves mention in a text-book of practice. Under dysentery nothing is said of the supposed rôle of the bacillus described by Shiga in its causation. The older conservative statements of the author in regard to the surgical treatment of appendicitis are modified by a brief note inserted by the translator. It seems strange at the present time to see advocated the employment of from six to ten leeches for the relief of the pain of acute appendicitis and the employment of saline baths, mercurial ointment, and iodide of potassium treatment for the promotion of the removal of "painless residua of exudate" following the acute attack. The work is not one that will be apt to be referred to by the practitioner of medicine, although, owing to the simplicity of its arrangement and numerous illustrations, it will be of considerable use to the student. F. A. P.

A BOOK OF DETACHABLE DIET LISTS. Compiled by JEROME B. THOMAS, A.B., M.D. Second edition, revised. Philadelphia: W. B. Saunders & Co., 1900.

THESE diet lists are now so well known that a review of them seems hardly necessary. The prescribing of diet in private practice, while of the most essential, is also one of the most difficult matters to deal with. Almost every plan that can be adopted has certain drawbacks. A mere enumeration of the list of articles which the patient must avoid is unsatisfactory to both patient and physician—to the patient, because when articles to be avoided alone are mentioned it seems as though there was nothing he could take; to the physician, because of the impossibility of carrying in one's mind the articles of diet which bear upon the particular case, and because of the indefinite character of his instructions so given. Two courses are open in trying to properly advise our patients in this extremely important branch of treatment. One of these plans is to use some such lists as those under consideration, the other the employment of a printed sheet in which the articles of diet are enumerated with columns wherein can be placed the directions as to the admissibility of each of them. After a quite extended experience with both plans it would seem that each plan has its advantages for different patients, the diet lists of Thomas being more convenient and time-saving than is the other list. The various directions that are given for the ten classes of cases are most excellent. Only one criticism can be made, and that may seem at first sight a trivial one. In almost all the text-books and special articles on the dietetic regulations proper in diabetes we find the statement is made that cranberries are admissible. While the cranberry itself would not be harmful to a diabetic the amount of sugar with which cranberries are always cooked makes the free use of this article, in the only form in which it is palatable, far more harmful than would be many other articles of diet more satisfactory to the patient in his hunger for amylaceous and saccharine food. In making up a dietary for any individual it is important to remember not only the chemical composition of the articles in question in their raw state, but, what is more important, their composition when brought on the table.

In addition to the detachable diet-lists for various diseases, there are added at the back of the book useful lists in regard to the sick-room dietary, and the methods of preparing and administering nutritious materials by the rectum.

These lists will be found most useful, but it is to be borne in mind that in prescribing diet for an individual case the physician should read over the list in order to adapt it to the needs of the individual patient, as the routine prescribing of diet is no more possible than is the routine prescribing of drugs. F. A. P.

A TEXT-BOOK OF PHARMACOLOGY AND THERAPEUTICS, OR THE ACTION OF DRUGS IN HEALTH AND DISEASES. By ARTHUR R. CUSHNY, M.A., M.D. Aberd., Professor of Materia Medica and Therapeutics in the University of Michigan; formerly Thompson Fellow in the University of Aberdeen, and Assistant in the Pharmacological Institute of the University of Strassburg. Second edition, revised and enlarged. Pp. xiv., 732. Philadelphia and New York: Lea Brothers & Co., 1901.

THE object of the author of this book, as he states it, is " to bridge over the hiatus which exists between the phenomena occurring in the normal organism and those which are elicited in the therapeutic use of drugs, to show how far the clinical effects of remedies may be explained by their action in the normal body and how these may in turn be correlated with physiological phenomena." In other words, he chiefly desires to place the application of remedies in the treatment of disease on a sound, experimental basis. Thus far the sequence of events is precisely that of experience. The fact reached by empiricism often awaits years for a satisfactory demonstration in the laboratory for its explanation; for example, quinine in the treatment of malarial fever; digitalis in cardiac diseases. On the other hand, to deduce therapeutical indications from the facts of laboratory research is by no means a method always to be pursued with either certitude or profit. Not that we would disparage the facts determined in the laboratory, but we would suggest that the interpretation of these facts may be various according to the training or the stand-point of the observer. While the argument of the laboratory is final when dealing with empirically ascertained and generally accepted data, to reverse the process is sometimes to invite the disaster to which prophets are particularly liable. From the standpoint of the pharmacologist striving to give logical explanation to and to place on a substantial foundation the every-day work of the clinician, this book is without an equal in the English language. In reading it we marvel at the industry of the author in collecting from the literature the vast assemblage of pharmacological facts. If we are not to be accounted captious we would suggest that all of our knowledge is not of German origin, but that France and Italy are vying with our own country in adding to a science that will endure. While we regard this work as a text-book of pharmacology and containing nothing which a student should not know, or with a fair degree of diligence cannot acquire, the application of these facts to the work for which this study is a part of his preparation is not always clear. What therapeutics—the application of remedies to the treatment of disease—this book contains is sound. There is, however, much that apparently has not suggested itself to the author. There is much, also, that needs the correlating influence of the expert clinician before it is readily available for use. Be it far from us to underrate the importance of laboratory work to which many years of our earlier life were devoted, but, on the other hand, let us not discourage the earnest workers who are doing magnificent work, because we overrate the possibilities of experimental research. Where this work fails of attaining its highest practical value is in the amount of therapeutics, and, in some instances, failure to correlate laboratory and clinic. Such might be noted as regards resorcin (p. 394), sparteine (p. 259), chlorine (p. 568), strontium (p. 558). We are particularly pleased that Burge's theories concerning iron are finally disposed of (p. 640). Of minor matters cacodylic acid is of sufficient therapeutical interest to have received more attention. Harrington's scholarly work on formaldehyde should influence every writer on the subject, and, finally, while Roberts' paper upon the action of opium on malarial fever is noticed the point of the paper seems to have escaped the author (pp. 217, 218). An important omission is that of the use of alcohol in carbolic acid poisoning (p. 393). The use of copper in phosphorus poisoning we are inclined to regard as of doubtful utility (p. 666), although it was formerly recommended. We believe that strict adherence to pharmacological nomenclature should be insisted upon, particularly in books intended for the use of students; in this the author, in company with others, is remiss. Since the errors are corrected with little difficulty, we trust in the next edition these blemishes will be removed. We have read this book painstakingly and thoroughly, and we have come to the end with unflagging interest. The amount of information which it contains is vast, and its presentation excellent. So far as concerns pharmacology, we believe its success is merited and will be continued. We cordially recommend the work and predict that its future will be still more brilliant.

R. W. W.

PROGRESS

OF

MEDICAL SCIENCE.

MEDICINE.

UNDER THE CHARGE OF

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Joint Affections in Scarlet Fever.—HOMA (*Wiener klin. Wochenschrift*, 1901, xiv., 281), during five and a half years in the Hospital for Contagious Diseases in Brunn, observed 506 cases of scarlet fever, in 14, or 2.8 per cent., of which there were complicating joint affections. These came on at the end of the first week five times; at the beginning of the second once; at the end of the second week four times; in the third week three times, and in the fourth week once. The onset occurred with a rise of temperature if fever were not already present, and tenderness and swelling of the joints. In the cases which did not end fatally from other complications or from the severity of the infection, the symptoms diminished in a few days. In six cases there occurred one, in one case two relapses. The joints of the hand were affected eight times, twice on both sides; the elbow-joint seven times, twice bilaterally; the knee-joint five times, four times bilaterally; the ankle-joint four times, twice bilaterally; the shoulder-joint and hip-joint each once. As a rule, various joints were affected at the same time. In one of these fourteen cases only was there suppuration. The treatment consisted mainly of rest, the application of Priessnitz's bandages, and, in four cases, salicylate of sodium internally. All but two of the cases were of moderate or extreme severity, other complications being present.

He concludes that joint affections in scarlet fever belong to the rather frequent complications; that in most cases they begin as an acute synovitis, with fever, pain, and swelling, the latter of which may be absent. Suppurative forms are rare. The onset occurs usually in the first or second week—that is, at about the beginning of desquamation—and the hand, elbow-, knee-, and hip-joints are those more commonly affected. The joint affections are usually multiple, and, occasionally, relapses follow. Endocarditis may occur, and is probably caused by the poison of scarlet fever, as is the synovitis. With rest, immobilization, and Priessnitz's bandages recovery occurs in a few days. Salicylic acid appeared to have no especially favorable influence. Even purulent synovitis may end in recovery.

Frequency of Typhoid Bacilli in the Blood.—For many years subsequent to the discovery of bacillus typhosus by Eberth, in 1880, the attempts to cultivate the organism from the blood proved almost invariably negative. Subsequently a few isolated cases of typhoid septicæmia were reported. Wissokowitsch found that bacillus typhosus, when injected into the general circulation of animals, soon disappeared from the blood and found lodgement in various organs, particularly the liver, spleen, and bone-marrow. These observations led to the general view that the typhoid bacillus entered the general circulation only rarely and very quickly disappeared.

Subsequent bacteriological researches have shown that this view is incorrect, and that typhoid septicæmia is comparatively common. The early negative results were due to the failure to recognize the germicidal properties of the blood. The cultures were made with undiluted blood, and the concentrated bactericidal substances contained in it prevented the growth of the bacilli. Kühnau was the first to take this property of the blood into consideration in making blood cultures in typhoid. He diluted the blood in 50 c.c. of bouillon and immediately plated. His report in 1897 gave eleven positive results during life in forty-one cases.

COLE (*Johns Hopkins Hospital Bulletin*, July 1901, p. 203), by a slight modification of the technique, has obtained even better results. From 8 to 10 c.c. of blood is obtained from one of the veins at the elbow after thorough disinfection of the part. No incision of the skin is made. The blood is immediately diluted in bouillon contained in Erlenmeyer flasks, about 150 c.c. of bouillon being used in each flask. From one to six such flasks were used for each culture, the dilution being from 1 : 75 to 1 : 150. The flasks were then well shaken and placed in an incubator for twenty-four hours, after which, if the bouillon were cloudy, agar plates were made. The organism was identified by its usual characteristics, including its property of agglutination with typhoid blood-serum. With this technique a positive result could be obtained in thirty-six hours.

Cultures were made in fifteen cases of typhoid, with positive results in eleven, which is a large percentage. The earliest day on which the organism was isolated was the sixth. In five cases the blood cultures were positive before the Widal test was obtained. The latest positive result was on the twenty-seventh day. Schottmüller reports having obtained positive results in forty out of fifty cases, and Unger in seven out of ten cases.

The importance of the taking of blood cultures in typhoid, considering these results and the fact that the Widal reaction is delayed in many cases, cannot be over-estimated in making a diagnosis of the disease.

Two Examples of Bence-Jones' Albumosuria Associated with Multiple Myelomata. A Preliminary Report.—HAMBURGER (*Johns Hopkins Hospital Bulletin*, February, 1901, p. 39) reports two cases in which the urine was shown to contain the so-called Bence-Jones bodies. In one case there was strong evidence and in the other positive evidence of the existence of multiple myelomata of the bones. The chemical reactions of the urine, which are characteristic of the presence of the Bence-Jones bodies, were practically identical in both cases, and the same description will serve for both. Heated to a temperature of 55° to 56° C. a heavy white precipitate fell. This redissolved in part on boiling and returned on cooling. Nitric acid caused a heavy ring which disappeared on boiling and also returned on cooling. The biuret reaction was marked. The proteid content in both cases was fairly high. In one case Esbach's albuminometer showed 0.27 per cent., and in the other from 0.3 to 0.6 per cent. In one case the proteid substances were precipitated with ammonium sulphate, and the precipitate was washed with water. The filtrate gave a definite biuret reaction, thus demonstrating the albumose character of these bodies.

The first case was in a woman, aged forty-nine years, a patient of Dr. Iglehart. The latter found that the urine presented reactions which differed from those presented by albumen. On analyzing the urine Hamburger recognized the reactions as being those characteristic of the Bence-Jones bodies, and suggested that the patient probably had some bone affection. It was then recollected that the patient had suffered intense pain over the left ninth rib. Subsequently the appreciable swelling appeared on this rib near the costo-chondral junction.

The second case was a colored woman, aged fifty years, who was under treatment in the medical wards of the Johns Hopkins Hospital while the first case was under observation. For a year she had suffered pain in the region of the right hip-joint. On admission there was a tumor the size of a child's head in this situation. There were tumors of the left acromion process, both clavicles, and one the size of an orange over the occiput. This patient eventually died, and at the autopsy multiple myelomata were found in the above situations. The histological report of the tumors is not given in this paper.

The Bence Jones bodies, which give the chemical reactions noted above, were first described by Henry Bence-Jones in 1847. The association of the reactions with changes in the bones was noted by him in this first case. The patient died, and Bence-Jones states that on "the following day I saw that the bony structure of the ribs was cut with the greatest ease, and the bodies of the vertebræ were capable of being sliced off with a knife." The condition was designated post-mortem as "osteomalacia fragilis rubra."

During the fifty years following Bence-Jones' observation only four cases of albumosuria associated with primary bone disease appeared in the literature. In the past three years eight additional cases have been recorded. In eight of the thirteen cases the autopsy disclosed neoplasms which could be classified as myelomata. In two cases the tumor was visible. In the remainder there was no record of a post-mortem inspection. The cases of Fitz and Askanazy are not included in this list. Fitz's case occurred in a woman with myxœdema, and Askanazy's in a patient with lymphatic leukæmia.

The exact nature of the Bence-Jones bodies has not been accurately determined. They are believed to be very closely related to but not identical with albumose. The origin of the proteid is also obscure. It has been found isolated both from the blood and bone-marrow.

The nature of the bone tumor is discussed at considerable length. The name "multiple myeloma" was first applied to the tumor by Rustizy. The tumor does not correspond to the usual conception of malignant neoplasms in the Cohnheim sense, owing to the fact that they probably never metastasize. In the gross these tumors form masses of soft reddish tissue of various sizes, often ill-defined, replacing the normal marrow and osseous substance. The sternum, ribs, vertebræ, and skull are especially prone to the affection. The tumors may or may not appear on the exterior. The bones become softened and are apt to suffer pathological fractures. Many of these cases are mistaken for osteomalacia, but albumosuria has never been found in the latter disease, so that the examination of the urine practically suffices to differentiate the diseases. Histologically in a majority of instances the structure of the tumor has been that of a round-celled sarcoma. Wright, who studied a myeloma in detail in connection with Fitz's case, found that the tumor elements consisted of a variety of plasma cells and believed that they originated in the plasma cell of the bone-marrow.

Dr. Welch, in discussing Hamburger's paper, drew attention to Wright's work as being the most recent contribution to the pathological anatomy of multiple myelomata. The myelomata were not to be considered tumors in Cohnheim's sense, and the nodules are not to be regarded as metastatic tumors secondary to a primary one. If future observations show that the tumor cells are predominantly plasma cells, as found by Wright, the tumors will belong to the class of new growths first designated by Unna as plasmomata.

The Relation of Diabetes Mellitus to Lesions of the Pancreas. Hyaline Degeneration of the Islands of Langerhaus.—OPIE (*The Journal of Experimental Medicine*, March 25, 1901, vol. v., No. 5, p. 527) refers to a previous paper of his, which has already been reviewed in this department, in which he strongly suspected as a result of a study of a series of cases of chronic interstitial pancreatitis that where diabetes mellitus existed with this lesion, it was due to degenerative changes in the islands of Langerhaus. In the present paper he reports the study of a case of diabetes mellitus in which the pathological findings were such that we can now say with certainty that cases of pancreatic diabetes are due to lesions of the islands of Langerhaus embedded in the gland.

The patient was a colored woman, aged fifty-four years, in whom symptoms of tuberculosis began to manifest themselves about eleven months before her death. Several months afterward symptoms of diabetes mellitus manifested themselves. On admission to the Johns Hopkins Hospital she was found to be suffering from advanced pulmonary tuberculosis, and the urine contained from 4 to 5.4 per cent. of sugar. The patient died several days after admission.

At the autopsy advanced pulmonary tuberculosis was found. The liver, spleen, and kidneys showed nothing of especial note. The brain was removed and found to be normal.

The pancreas weighed 80 grammes and measured 23 x 5 x 1 cm. It was readily dissected from the surrounding tissues. It was soft in consistence, and on section had a gray-yellow color. Histological study of the gland showed no generalized increase of the interstitial tissue, but here and there, particularly in the tail of the organ, the fibrous stroma showed some proliferation. The normal secretory glandular epithelium was practically normal, beyond some small areas where post-mortem digestion had occurred. In striking contrast, however, was the condition of the islands of Langerhaus. These showed most extensive hyaline degeneration. Only rarely was an island found in an unaltered condition. Some islands showed only partial destruction, while many showed complete destruction by the degenerative process. The hyaline metamorphosis was limited strictly to the islands of Langerhaus, the glandular acini remaining intact. In specimens stained in eosin the islands stand out very conspicuously, as the hyaline material takes a deep eosin stain.

Opie discusses hyaline degeneration at length from a pathological standpoint, and refers in detail to the staining properties of hyaline material.

The writer considers this case of great importance from the stand-point of etiology and pathology of pancreatic diabetes. In his previous study he had endeavored to demonstrate that in diseases of the pancreas associated with diabetes mellitus the islands of Langerhaus were always seriously involved. In the present case which he reports there was no demonstrable pathological lesion outside the pancreas to which the diabetes could be attributed. Even in the gross the pancreas looked practically normal, but microscopic examination demonstrated that the pathological lesions were absolutely localized in the islands of Langerhaus.

Opie's concluding words briefly sum up our latest knowledge concerning pancreatic diabetes toward which he has contributed such valuable information. He says: "Destruction of the pancreas in animals and in man is accompanied by diabetes; in the present case destruction of the islands of Langerhaus has been accompanied by this disease. Since diabetes is absent, when as a result of duct destruction, the secreting portion of the gland undergoes great alteration, though the islands are spared, the conclusion is justified that it is those structures which influence carbohydrate metabolism. What has been learned concerning the action of the pancreas to diabetes is the relation of the islands of Langerhaus to this disease."

The Pathology of Active Tuberculosis of the Pericardium.—WELLS (*Journal of the American Medical Association*, May 15, 1901, p. 1451) has made a careful study of tuberculosis of the pericardium, the work being based on the examination of ten cases which occurred in a total of 1048 autopsies performed at Cook County Hospital.

The writer emphasizes the point that pericardial tuberculosis is not nearly so uncommon as generally supposed. It occurs in about 1 per cent. of his series. Of the 1048 autopsies, 364 presented distinct tuberculous lesions elsewhere than in the pericardium, of which 208 were active. In all the bodies with active tuberculosis, therefore, about 5 per cent. presented active tuberculous lesions in the pericardium. In the entire series the pericardium was found affected in some way in 128 cases; of these, the ten cases of tuberculous pericarditis constitute nearly 8 per cent. Tuberculous pericarditis is very likely to occur in the young.

Anatomically tuberculous pericarditis may occur (1) as an acute miliary eruption on the pericardium, with a serous or hemorrhagic exudate ; (2) in the form of a miliary eruption, but of a more chronic type, accompanied by fibrous synechiæ, but without effusion ; (3) as a definite caseous process. The best pathologists and clinicians agree that a sanguineous effusion points strongly toward tuberculosis, although the effusion in malignant processes is also liable to be hemorrhagic. The myocardium may be involved secondarily or primarily, the former being the more common.

Wells challenges the view that there is a primary tuberculosis of the pericardium. He thinks that there is always a primary focus elsewhere in the body. The possible methods of infection of the pericardium are (1) Hæmatogenous, generally in the course of a miliary tuberculosis. (2) Lymphogenous, the bacilli coming through the lymph vessels either in the normal direction or with a reversed current. (3) Extension, in about the order of frequency, from mediastinal glands, pleura, myocardium, and vertebræ.

Infection of the pericardium is considered much more common by way of the lymph stream than by the bloodvessels. Tuberculosis of lymphatic origin is generally most marked on the parietal pericardium ; that of hæmatogenous origin affects most often the epicardium. From the pleura direct extension may occur as well as by the lymphatics. It is probable, however, that direct extension from the pleura, as from the lymph glands, is not so common as lymphatic transmission.

Wells states that there is no doubt but that tuberculosis of the pericardium may heal entirely. The disease may lead to the production of synechiæ and of the condition of adherent pericardium. He states that adhesion of the pericardial layer seems much less likely to cause serious cardiac disturbance when due to tuberculosis than when due to rheumatism.

The myocardium may be affected in two ways: by a fibrous interstitial process, or by direct growth of the tubercles into the heart walls. The interstitial myocarditis is much less extensive and serious than that which follows rheumatism. Myocardial tuberculosis may occur in several forms: 1. Miliary tubercles, generally in miliary tuberculosis. 2. Large tubercles, usually multiple, and at times reaching the size of a hen's egg. 3. Diffuse tuberculosis, extending through a considerable part of the myocardium, chiefly as fibrous tissue intermingled with nodular and caseous tuberculosis, very rare. 4. Interstitial myocarditis, with occasional tubercles scattered about in the fibrous tissue without caseation, also rare. A myocardial tuberculosis may heal. The condition of cardio-tuberculous cirrhosis of the liver occasionally occurs in tuberculous pericarditis. The lesions consist generally of a diffuse fibrous increase plus miliary or small nodular tubercles, but sometimes only diffuse sclerotic changes or fatty cirrhosis without tubercles.

As to the termination of tuberculous pericarditis healing is considered possible. Healing occurs only in cases that are subacute or chronic from the start. Wells states that while calcification of a tuberculous exudate is possible he has been unable to find a well-authenticated case in which this calcification has been shown to originate on a basis of tuberculosis. Death is the most usual termination. It may be due to interference with the heart in the stage of effusion, but usually it is due to the associated tuberculous lesions of other viscera. Tuberculous pericarditis is generally unaccompanied by any symptoms referable to the heart, and is almost always an autopsy finding.

SURGERY.

UNDER THE CHARGE OF

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The Treatment of Joint Tuberculosis.—HILDEBRAND (*Correspondenz-Blatt*, January 15, 1901) states that the ideal aim in the treatment of joint tuberculosis is to eradicate the disease, and thus enable the joint to resume its normal functions. The remedy sure to accomplish all of this remains to be discovered. Many cases have proven that joint tuberculosis can be cured, but with impaired function. Nature accomplishes this either by replacing the tuberculous infected tissue with connective tissue, or else encapsulating it, and so preventing further extension of the disease. The functional result is most varied, depending upon which of these two processes has taken place. Treatment, then, should be directed toward either eradicating or encapsulating the area of disease. This can be accomplished by the direct irritation of the tuberculous area by means of chemicals, or indirectly by gradually destroying the tuberculous focus by artificially increasing the motion of the surrounding healthy tissue, and so causing the formation of connective tissue. Lastly, by the mechanical removal of all the area of infection. The method of choice in each case depends upon a series of factors which have nothing to do with the patient's disease.

The treatment should be different in the cases of adults and those who are still growing; and, still further, it varies as to whether the synovial membrane or the bone is involved. The differential diagnosis between the synovial and osteal forms is extremely difficult, but the radiograph will be found of much assistance in all cases. Patients who have not yet reached their full growth should always be treated by the conservative method, which is generally followed by a good result. This treatment consists in complete fixation of the affected joint by means of appropriate bandages, so that there may be every opportunity for the synovial membrane to so unite that the area of infection becomes encapsulated. Experience has shown that the injection of iodoform is most beneficial, especially in children, and that it is the best of all the drugs recommended for the local treatment of tuberculosis. Another drug that should be mentioned is formalin, which acts as a caustic, destroying the tuberculous tissue and bacilli and promoting the formation of healthy granulations. These injections are painful, but its use has been beneficial in many cases. This form of treatment is only of benefit when the synovial membrane is alone involved. In the osteal form of the disease, especially where necrosis has taken place, it is of no value. The method of Bier, which is the production of venous engorgement of the affected area, has proved efficient in many of these bone cases. In some few cases the intravenous injection of hetol has proved to be a successful method of treatment experimentally. It produces around the tuberculous area an infiltration of leucocytes and dilatation of the capillaries, which is followed by the formation of connective tissue rich in nuclei. The author has tried this method in thirty-five cases, but in not one did there seem to be any improvement. It is, of course, only applicable to the synovial form of the disease. After these treatments have been given a fair trial and failed, arthrectomy is to be considered, but it is only admissible in certain joints. It should not be performed in the case of children where the knee is involved, because of the disturbance of growth which of necessity follows. It is but seldom indicated in the cases of involvement of the hand, elbow, and foot, but it is indicated in coxalgia, and in tuberculosis of the acetabulum and ileum. In marked cases of coxalgia, where there has been much destruction of tissue, resection is the best operation. In all cases of joint tuberculosis amputation is but rarely to be considered. The treatment of joint tuberculosis in adults is very different from that of children, for one has not to consider the question of future growth, and so radical operations can often be considered at once. It is usually best not to experiment too long with conservative methods of treatment, but just as soon as pus has formed, when fistulæ have appeared, when mixed infection has occurred, resection should be performed. It is indicated in every joint, there being no exception to this as there are in the cases of children. This operative treatment has given splendid results—70 to 80 per cent. are cured permanently. This treatment should, of course, have the adjuncts of good air (mountain or sea), good food, an out-of-door life, and, internally, creosote and guaiacol. The estimation of the results of the different treatments of joint tuberculosis is very difficult, for in those cases which are cured by non-operative methods of treatment there is often a question as to whether or not the diagnosis was correct. Hydrops articuli and synovitis have sometimes been diagnosed as tuberculosis, and experience has shown that it is only by operative treatment that the diagnosis can be positively made.

Urotropin.—SUTER (*Correspondenz-Blatt*, January 15, 1901) states that urotropin is the product of the combination of formaldehyde and ammonia. It is a white, crystalline, hydroscopic powder, easily soluble in water. Experiments have shown that a portion of urotropin is broken up by the acid contents of the stomach into its constituents, while the rest passes out into the intestines, there to be absorbed. It is best to give urotropin upon an empty stomach, so as not to have it come in contact with the acid of digestion, but best of all would be to give the urotropin in capsules, so that it would pass undecomposed into the intestines, there to be broken up and absorbed. In order to determine the efficacy of urotropin as an antiseptic in the various forms of infection of the urinary passages, the author experimented with the following bacteria: staphylococcus pyogenes albus and aureus, streptococcus pyogenes, bacillus typhosus, bacillus coli communis, proteus Hauser, and the bacillus aërogenes lactis. As a result it was found that the typhoid bacillus, colon bacillus, and bacillus aërogenes lactis seemed to possess greater power of resistance than did the proteus Hauser and the pyogenic cocci. Further experiments showed that urotropin is by far the strongest of any of the urinary antiseptics. Urotropin should be administered some hours before the passage of sounds or catheters, so as to render the urine antiseptic and to minimize the dangers of infection, and its use is also indicated before any operation on the bladder or prostate. Urotropin is valuable in the treatment of certain forms of cystitis, but it is important to remember that in many cases the bladder wall is more or less extensively involved, and it is in this class of cases that the action of urotropin will be slow. Experience has shown that urotropin is of practically no value in tuberculosis of the bladder and gonorrhœal cystitis. It has, however, been found to be particularly serviceable in those cases of cystitis due to infection of the prostate, prostatic hypertrophy, or urethral stricture, in which there is retention, especially so in those cases where the reaction of the urine is acid.

Enlargement of the Inguinal Glands in Cancer of the Rectum.—VIANNAY (*Gaz. Hebdom. de Méd. et de Chir.*, February 24, 1901) states that enlargement of the inguinal glands in cancer of the rectum is rare, but reports two cases in detail to show that it may occur. In one of the author's cases it was the first symptom of a latent cancer of the rectum. The enlargement of the glands may be due to a simply inflammatory process, while, on the other hand, it may be the result of the presence of the cancer cells in the glands. In those cases where the glands are involved and operation is decided upon, the artificial anus should be established on the same side as the involved glands, and where both sides are involved it is best to establish it in the median line.

A Contribution to the Study of Hæmothorax.—TUFFIER and MILIAN (*Rev. de Chir.*, April 10, 1901) state in conclusion that the increase in volume of the effusion, which is marked toward the fifteenth day, is not due to the continuation of the hemorrhage, but to the exudation of serum. It is easy to show by exploratory puncture that the fluid is clear. This increase of the effusion should not be considered an indication to operate. Moderate fever, especially when of non-bacterial origin, but only due to the absorption of the exudate, is also not an indication for operative interference. The persistence of polynuclear leucocytes after the twenty-fifth day is a very positive indication that suppuration has occurred. A differential count should be made each day, and the polynuclear leucocytes should always be fewer in number than the lymphocytes and mononuclear leucocytes. The best treatment of traumatic hæmothorax is by capillary puncture, which should be performed about the fifteenth day, when the wound of the lung is sufficiently cicatrized, so that there need be no fear of a new hemorrhage beginning as soon as the injured lung is relieved from the pressure of the exudate.

Urotropin as a Urinary Antiseptic.—CAMMIDGE (*Lancet*, London, January 19, 1901) states that the effects of urotropin on the urine of a normal individual are absolutely *nil*. It has no diuretic action, and does not cause any appreciable change in the excretion of the urine's chemical constituents.

It was found in the urine ten minutes after the first dose was administered, and it still continued to be excreted in small quantities twenty-six hours after the administration had been discontinued. As a rule, urotropin is well borne, though some patients may have an idiosyncrasy toward it. All investigators are agreed that much of the urotropin taken by the mouth is passed unchanged; but there is considerable divergence of opinion as to whether the antiseptic properties of the urine are due to the drug itself or to some decomposition product arising from it. As the result of chemical experiments with the bacillus typhosus, bacillus coli communis, and the staphylococcus pyogenes aureus the author found: 1. Urotropin alone may, by prolonged heating, be made to yield formaldehyde, but that this decomposition does not take place at body temperature. 2. An alkaline solution of urotropin may be similarly decomposed, but that the body temperature is not sufficient to cause the change. 3. Dilute acids quickly decompose urotropin on boiling, with the evolution of free formaldehyde, and that this change occurs to a less degree at 37° C. 4. Acid salts—*e. g.*, of the urine—liberate formaldehyde from urotropin in boiling, but not at 37° C. 5. The acid urine of a person taking thirty grains of urotropin a day does not contain free formaldehyde. As a urinary antiseptic urotropin appears to be much superior to those usually employed, such as salol, ammonium benzoate, boric acid, guaiacol, naphtalin, and resorcin, especially when the acidity of the urine is ensured by suitable measures. It is not, however, only as a curative agent in the ordinary forms of urinary infection that the advantages of the drug are so apparent, but in typhoid fever it may be employed from the third or fourth week onward to the advantage both of the patient and the community at large. Recent researches have shown that typhoid bacilli occur much more frequently in the urine than has been generally supposed, and that they may persist for very long periods. After convalescence in one case they were found five years later. By the systematic use of urotropin in all cases the real danger from this source, which is so frequently overlooked, may be entirely avoided.

Calculus of the Prostate.—PASTEAU (*Annales de Mal. de Organ. Genito-urinaire*, April, 1901) after reviewing the subject in detail states in conclusion that it is important to distinguish between (1) the urinary calculus that may develop in the prostatic urethra or its diverticulæ, or that may descend from the upper part of the urinary tract and finally lodge in the prostatic urethra; and (2) the true intraglandular calculus of the prostate, whose development has been attributed to an attenuated infection of the gland. This last form is very much rarer than the urinary calculus.

A Report of Seven Operations for Brain Tumors and Cysts.—HOPPE (*Journal of the American Medical Association*, February 2, 1901) states that the early wave of enthusiasm which followed the brilliant successes of Macewen, Godley, Horsley and Keen has been gradually displaced by an amount of pessimism which is unwarranted by the cumulative results of brain surgery for tumors and cysts. The pendulum has swung too far to the side of non-interference. This has been the direct result of numerous unwarranted operations in cases of suspected brain tumor, or in cases where the tumor was not accurately located. The author feels safe in saying that hundreds of such cases, at a very low estimate, have been operated upon, which will never be spread on the annals of surgery or neurology. These are the cases which have done great damage and have been the cause of the pessimism which prevails, not only among the profession at large, but, what is far worse, among the laity, who are only too apt to remember the failures and forget the successes, especially if the former outnumber the latter.

It is true that the enthusiastic hopes and predictions of the early enthusiasts have not been verified, but the fact remains that the field for brain surgery for tumors and cysts, although very much narrowed, is still a considerable one, and one in which relief can be given and much good done. Pessimism always leads to inactivity and nihilism. Many a life could be prolonged, made more comfortable, and even saved, if the general practitioner and the general public once more felt the confidence born of successful results obtained in well-selected cases. Even in the latter, the mortality will always be great on account of the unwillingness of patients to be operated upon in the early stages; but if we consider that with the extremely rare exceptions all cases of brain tumor are fatal, even the large mortality will not deter us from not only advising but urging operations. It would seem too much to hope that the history of cancer operations might be repeated in brain surgery, but the principle is the same, and the success might be equally brilliant if, as in cancers, operations are done early on well-selected cases. In this way we may hope that the confidence of the general practitioner and of the public will be restored.

The author reports the following seven cases:

Case I.—Male, aged thirty-two years. First symptom, Jacksonian epilepsy; local symptoms, Jacksonian epilepsy of left arm and leg; general symptoms, general convulsion, headache, and vertigo; optic disk negative; operation, trephining; seat of tumor was in right foot and arm centre; result, hemiplegia, epilepsy; still living after seven years.

Case II.—Male, aged eighteen years. First symptom, hemianopsia; local symptoms, total blindness; general symptoms, headache, vertigo, and nausea; optic disk pale; operation, trephining; seat of tumor was in left occipital lobe; result, recovery of sight; still alive after seven years.

Case III.—Male, aged twenty-two years. First symptom, Jacksonian epilepsy; local symptoms, epilepsy, epileptic insanity; general symptoms, none; optic disk negative; operation, trephining; seat of tumor, cyst over right leg centre; result, improvement for six months, and died after one year.

Case IV.—Male, aged ten years. First symptom, spastic paralysis of left arm; local symptoms, spastic hemiplegia; general symptoms, headache, apathy; optic disk choked; operation, trephining; seat of tumor in subcortical motor area of right side; result, died in four hours from shock.

Case V.—Male, aged forty-six years. First symptom, sensory aphasia; local symptoms, sensory aphasia; general symptoms, headache and mental confusion; optic disk negative; operation, trephining; seat of tumor, cyst of first temporal sphenoidal lobe of left side; result, much improved for sensory aphasia, and still living.

Case VI.—Male, aged thirty-two years. First symptom, numbness and weakness of left leg; local symptoms, Jacksonian epilepsy, hemiplegia, and diplegia; general symptoms, headache, vertigo, and apathy; optic disk choked; operation, trephining; seat of tumor was in right foot centre; result, died from shock in four hours.

Case VII.—Male, aged twenty-three years. First symptom, general epilepsy; local symptoms, spastic hemiplegia; general symptoms, coma and convulsions; optic disk negative; operation, trephining; seat of tumor, multiple cysts; result, died from cerebral hemorrhage.

The following are the conclusions which most authorities have come to as a result of the observation of their own cases and the study of the literature on the subject: 1. Tumors of the cortex or subcortical region of any portion of the cerebral hemispheres which can be reached through the calvarium are operable. 2. If possible the operation should be performed early, when the tumor is small; but even large tumors and those infiltrating in character have been operated on with success. 3. A study of the successful cases shows that, with few exceptions, brain surgery is limited to the psychomotor areas (von Bergmann). 4. The result of surgical interference, even in the most successful cases, rarely leads to complete recovery. The general symptoms due to intracranial pressure disappear, but the focal symptoms, viz., the epileptic seizures and paralysis, either remain permanently or are only diminished. It must not be forgotten, however, that the life of the individual has been saved. 5. Cerebellar tumors are inoperable. This is the law laid down by Oppenheim and concurred in by Bergmann. Those of the posterior and upper surface of the cerebellum, near the lower margin of the occipital lobe, have been removed, but the operation has been invariably fatal (Oppenheim). The danger is due to the crowding of large sinuses into a small field of operation and the pressure upon and displacement of the medulla. Occasionally a cyst has been luckily tapped, but we can never localize with certainty, and we all know how disastrous exploratory operations are in this region. 6. The cumulative experience of all writers is against the exploratory operation. 7. Shall we advise palliative operations? On this subject authority is divided. Horsley, Bramwell, Annandale, Sanger, Sahli, Sinking, Keen, Bruns, and perhaps Oppenheim are in favor of palliative operations for the relief of violent symptoms of increased intracranial pressure in rare cases. Von Bergmann and Von Braman are against it. The author's limited experience in cases in which he refused to advise an operation and the operation was, nevertheless, performed, has been with those who oppose the operation. 8. The author does not agree with Oppenheim that gummata should not be operated on. He has in his possession the brain of a man who refused to be operated upon which shows that the gumma could have been removed successfully. This gumma was located accurately and diagnosed as such in the arm centre during life. In his opinion tubercles, if isolated and located so as to be operable, should be operated upon, other things being favorable. Metastatic carcinomata are inoperable.

The Rontgen Rays and the Diagnosis of Urinary Calculi.—MOULLIN (*Lancet*, London, January 19, 1901) states that unless there is some unusual difficulty, such as an abnormally short abdomen or an extreme lumbodorsal curvature, displacing and burying the kidney, the Röntgen rays can be relied upon to give definite and accurate information not only as to the existence of a calculus, but as to its size, its exact position, and, what is even more important, whether there are other calculi present either in the same or in some other part of the urinary tract. The best results are obtained with calculi composed of oxalate of lime. If no calculus is shown after a second examination, repeated under varying conditions, it may be taken as certain that there is no calculus there. In many instances Röntgen photography is the only method by which the presence of a fixed calculus can be ascertained. Under ordinary circumstances the Röntgen rays are not required in cases of vesical calculus. The diagnosis can usually be made with the sound, but in those cases associated with enlargement of the prostate this method fails completely, and the Röntgen photograph is absolutely essential in order to make the diagnosis. In making skiagraphs of the kidneys it is best to firmly apply a bandage over that portion of the trunk so as to restrict as much as possible the movements of the kidneys during breathing. Unless everything is certain a second examination should be made after a few days' interval, and, if there is any doubt, then a separate exposure should be taken of the area in question, a leaden plate with a circular opening exactly opposite the anode being interposed between the tube and the patient, so as to cut off as far as possible all extraneous rays and obtain a better defined shadow.

The Indications for and Limitations of Spinal Cocainization in Surgery.—FOWLER (*Medical Review of Reviews*, April 25, 1901) states that as the result of his experience he believes that this method has a place in surgery. The author has employed it in operations upon the legs, region of the knee, thigh and groin, extraperitoneal operations in the pelvic region, including the perineum and anorectal region; intraperitoneal operations in the pelvic region; abdominal section; for the radical cure of inguinal hernia; upon the abdominal wall; renal region, and upon the thorax. All of the cases were entirely successful. The author states in conclusion that this method is applicable to a large number of operations. It is simple, easy, and without danger. It involves a very small loss of time, does away with at least one skilled assistant, the anæsthetizer, and will permit of the performance of many operations, with the help of nurses, or even of strictly non-professional persons alone, as in emergencies, war surgery, etc. No contraindications to its use in the areas in which it is applicable have as yet developed, save those pertaining to the mental state of the patient and purely æsthetic considerations. Of these latter the operator in the case must be the judge, and come to a conclusion as to the choice between the employment of a general anæsthetic and subarachnoid lumbar cocainization. The patient's own wishes in the matter should not be ignored, since, under certain circumstances, his morale may be so interfered with as to lead to serious psychic disturbances.

The Treatment of Recent Luxation of the Peroneus Tendons.—REERINK (*Centralblatt für Chir*, January 12, 1901) reports the interesting case of a man who slipped on attempting to mount his horse, and so produced a dislocation of the peroneus tendons of the left leg. Examination soon after the accident showed that immediate reduction was impossible owing to the great swelling of the region of the external malleolus. Six days later, the swelling having subsided, the dislocated tendons were reduced, and maintained in position by strips of adhesive plaster 1½ cm. wide and from 6 to 8 cm. long. These strips were very lightly applied, and four days later were covered in by a thick gypsum bandage. This bandage was worn for five weeks, when it was removed and the foot massaged daily for several weeks, when all treatment was stopped. Examination showed that the result was perfect, the tendons were in their proper position, and moved in a normal manner. When seen six months later there was no sign of any relapse or weakness in this leg.

Hysterical Tympany, Laparotomy, Relapse.—LONDE and MONOD (*Gaz. Hebdom. de Med. et de Chir.*, February 28, 1901) report the case of a man, aged thirty-three years, who presented himself with a large tympanitic abdomen. Examination showed that there was no ascites; that palpation was not painful except in the region of the liver; that the lungs were normal; that there was indigestion and cramp-like pains after eating; some slight dilatation of the stomach, but the bowels were regular. Examination of the nervous system showed that there was total anæsthesia of the left side, but no disturbance of motion. The patient complained of persistent headache, but vision was normal. The patient's general condition was excellent, appetite good, no fever, and a normal pulse. A laparotomy was performed in 1896, the diagnosis then being tubercular peritonitis, the only symptom at that time being marked tympany. Soon after this operation the abdomen returned to its normal size, and the patient believed himself to be completely cured, but three months later the pain reappeared and the abdomen again became tympanitic. A second laparotomy was performed in 1898, and was followed by a second period of apparent cure, but four months later the old symptoms reappeared, and have continued so ever since. This case is undoubtedly one of general hysterical tympany.

Luxation of the Median Nerve.—DEPAGE (*Annales de la Soc. Belge de Chir.*, December, 1900) reports the interesting case of a boy, aged fourteen years, who three months before his entrance to the hospital sustained a luxation of the right elbow. As the result of this accident there was an absolute loss of power of the forearm and of the hand and insensibility of the external portion of the latter. Luxation was reduced immediately. Soon after the dressings were removed motion returned to the forearm, but the paralysis and insensibility persisted. Examination showed that there was no atrophy, that there was no deformity at the elbow, and that the articular movements were intact. The muscles supplied by the median nerve were paralyzed, the nerve presented a total absence of electrical reaction, and a loss of sensibility of all that portion of the hand supplied by the median nerve. Believing that the median nerve was being pressed upon by scar tissue, the author proceeded to operate. An incision was made over the internal border of the biceps muscle and followed down until a large nerve was exposed in the upper part of the incision, which by its size and its relations resembled the median. This nerve was closely connected with the mass of fibrous tissue which was dissected away, and after searching in vain in the lower portion of the incision for the median nerve the wound was closed with sutures. This operation was followed by such slight benefit that another operation was decided upon. This consisted in an incision 8 cm. long behind the olecranon. The ulnar nerve was discovered retracted to the inner side, while the median nerve was found behind the epitrochlear, incased in a mass of connective tissue, and separated from the ulnar nerve by a small amount of fibrous tissue which seemed to be the inner muscular aponeurosis. The median nerve was dissected out and returned to its normal position. As a result of this second intervention the sensibility remained abolished to the extremities of the index and middle fingers, while in the thumb and the palm of the hand it remained normal. There is much more motion in the hands than formerly. Willems, in discussing this case, stated that he had seen two somewhat similar cases in which the trophic lesion followed a dislocation of the shoulder. One case terminated in complete atrophy of the arm, and was twice operated upon; the first time the axillary plexus was exposed, while the second time the roots of the plexus in the subclavicular triangle were exposed, but careful examination revealed absolutely nothing.

Some Errors in Diagnosis in Conditions Resembling Appendicitis.—BREWER (*Annals of Surgery*, May, 1901) states in conclusion, after a careful analysis of eleven cases, that renal calculi may produce pain, simulating that produced by lesions of the appendix or the biliary passages, and are often unaccompanied by classical signs such as hæmaturia, vesical irritation, and tenderness in the lumbar region. Occasionally small stones may be overlooked after inspection and palpation of a kidney through a lumbar incision. Cysts of the right ovary or parovarian, when strangulated by a twisted pedicle, may often present symptoms which closely simulate an acute appendicitis. A twisted hydrosalpinx may simulate the same disease.

It is well known that cholecystitis and appendicitis are extremely hard to differentiate. The negative results of palpation of the region of the pancreas through the walls of the stomach or the tissues of the omentum by no means exclude an acute suppurative process in that organ; the presence of small, white areas of fat necrosis generally distributed over the peritoneal surfaces should immediately direct our attention to the pancreas, and also that the local condition or the general sepsis caused by this lesion may give rise to symptoms and signs strongly simulating those produced by a general infection of the greater peritoneal sac. A rapidly growing sarcoma of the small intestine is often mistaken for acute appendicitis, and in the early stages of their development these growths produce no obstruction, and often give rise to no discomfort. Severe general sepsis, from infected foci entirely removed from the abdominal cavity, may often give rise to symptoms and signs identical with those produced by a local or general peritonitis.

The Treatment of Malignant Tumors by the Anticellular Serum of Wlaeff.—REYNIER (*La Presse Méd.*, February 16, 1901) reports two interesting cases treated by this method. The serum is obtained as the result of the inoculation of birds with the pathogenic blastomycetes, yeast cells, isolated from the cancerous tumors of the human being. The first case was a marked one of cancer of the tongue, who came for operation, but careful examination showed the condition to be inoperable. Medical treatment was advised, but the patient's condition became steadily worse; he had terrible hemorrhages and excruciating pain, deglutition was almost impossible, and the tongue was ulcerated and adhesive to the floor of the mouth. The right axillary and cervical glands were of enormous size, and, on the whole, his condition was extremely bad. At this time the injection of the serum was begun and repeated at frequent intervals. After the first injection the pain disappeared, sleep became possible, the tongue decreased in size, and deglutition was easily performed. After ten injections the patient was so much improved that he was able to attend to his business. There was a cessation of the steady loss of weight, and the patient could speak, which was impossible before the beginning of the treatment. The enlarged glands decreased somewhat in size, and the condition of the tongue was improved. The second case was that of a woman with cancer of the breast, who also improved under this treatment. The tremor diminished markedly in size, but ultimately it was removed by operation. On microscopical examination it proved to be a cylindrical epithelioma. The serum of Wlaëff has an evident action upon neoplasms, as has been proved in many cases, but this action is not radical, and, furthermore, it is not lasting, for experience has shown that when one ceases the injections the tumor at once begins to grow and extend. This serum will never replace operative interference.

PEDIATRICS.

UNDER THE CHARGE OF

LOUIS STARR, M.D.,
OF PHILADELPHIA,

AND

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Death due to Hypertrophy of the Thymus.—TAILLENS (*Revue Médicale de la Suisse Romande*, June 20, 1901, p. 345) sums up his conclusions of a study under this title as follows:

1. In certain cases hypertrophy of the thymus can be a cause of death.
2. The mechanism of this accident varies as it follows the convulsive form, producing sudden death by action on the heart, or the compressive form, which acts slowly by asphyxiation.
3. In the convulsive form treatment is useless since the symptoms occur so rapidly that there is no time to act. In the compressive form medical treatment is useless, and even intubation or tracheotomy has proven futile. The only case definitely diagnosticated and cured by operative procedure—Siegel's—suggests a rational plan of treatment of this form (opening of anterior mediastinum and suture of the gland to the substernal fascia).

4. The pathological importance of hypertrophy of the thymus may be very considerable, especially in legal medicine, in which death has been wrongly attributed to negligence or criminal intent. (Cases cited by Grawitz and Ramoino.) It is possible that in rare cases the thymus may be at fault when death is attributed to goitre, or in some cases in which it is impossible to dispense with the tube after tracheotomy.

5. The expression thymic asthma does not seem to the author to be exact. The rapid convulsive form would be better designated under the name of cardiac death, or sudden death, due to the thymus, while the slow asphyxic form should be designated as thymic tracheostenosis. These two designations would serve to emphasize the difference between the two forms and their different mechanisms, as well as to prevent the classification under the name thymic asthma of a number of affections which have nothing in common with the thymus gland.

The Diazo Reaction in Diphtheria.—LOBLIGEOIS (*Revue mensuelle des Maladies de l'Enfance*, June, 1901, p. 270) has made a careful investigation of this sign in the urine of 118 cases of diphtheria, confirmed by bacteriological examination, among patients under treatment at the Hôpital Trousseau in the service of Guinon. The urine was examined every day from admission to discharge from the hospital in each case. In control cases it was found that the use of the antitoxic serum had no influence upon the appearance of the reaction, and could be neglected altogether in the results.

According to RIVIER (*Thèse de Paris*, 1898), who has collected forty-four cases in which the presence or absence of this reaction had been recorded, only five positive results had been observed by seven competent authorities (Ehrlich, Escherich, Feer, Nissen, and others). The author's observations in the much larger series lead him to believe that the frequency of recurrence of the diazo reaction is even less than these figures would indicate, since he found it only in five cases out of his 118, from which four, he thinks, should be eliminated for various reasons: two, in which the patients coincidently suffered from scarlatina; one, in which the reaction was positive only on the day of death, the child dying in convulsions from bronchopneumonia, and a fourth, in which the diazo reaction was positive for four consecutive days while the child presented an intense scarlatiniform erythema which was probably a true scarlatina. This, therefore, shows but one instance of positive reaction in 114 cases of diphtheria which were not accompanied by another known infectious malady.

In ten cases the color was a bright red, but on agitation the foam was orange-colored and not rose, and, therefore, could not be accepted as positive. In most of these cases the color persisted only for a day, three times only for a second day. Four times it coincided with a serum erythema; once the child was affected with pneumonia, and once there was a concomitant pleurisy. In the four cases in which the coloration lasted for a day coincident with a serum eruption, it was never characteristically positive. Since then examinations of the urine of seven or eight cases during the serum erythema has yielded negative results.

This latter observation offers an important diagnostic sign. Not infrequently the diagnosis between a scarlatiniform erythema due to serum and a true scarlatina is extremely difficult, since scarlatina often complicates diphtheria. Clinically the eruptions are very similar, and the throat may be quite red in both diseases. Under these conditions the presence or absence of the diazo reaction offers valuable aid in the diagnosis. In twelve cases showing the serum exanthem the diazo reaction was absent. In scarlatina Brewing found it present in three out of six cases; Nissen, in eleven out of twenty-three in the first days of the disease, and Rivier in twelve out of twenty-six. These figures appear to be lower than the author's experience would indicate, for he has found the reaction present in eight out of eleven cases of one series and in all of seven cases of a second series, the test having been made upon cases of scarlatina in full eruption. Altogether, the diazo reaction has been found positive in scarlatina in twenty-six out of fifty-five cases of other observers, and in fifteen out of eighteen in his own researches. He, therefore, considers the diazo reaction as an important diagnostic sign between scarlatina and the scarlatiniform erythema due to serum. If the reaction is positive, scarlatina may be affirmed; if negative, there is strong presumption against scarlatina.

The same conclusion would be justified, in the absence of other signs, for the diagnosis between an antitoxin rash and measles, in the latter of which the diazo reaction has been found positive seventy-five times out of eighty-five, according to the authors cited by Rivier.

Value of the Widal Reaction in Infancy.—JOHN LOVETT MORSE (*Archives of Pediatrics*, May, 1901) concludes that in early infancy a positive Widal reaction is of somewhat less diagnostic value than in older children and adults. If the mother has had typhoid, and especially if she is nursing the infant, it should be looked on with some suspicion, unless associated with other characteristic signs of typhoid. Examination of the mother's blood and milk and the cessation of breast feeding will then assist in estimating the true value of the reaction in the infant.

Malaria in Children.—WM. A. NORTHRIDGE (*Brooklyn Medical Journal*, April, 1901, p. 175) states that the four most important symptoms of malaria in the child are fever, periodicity, anæmia, and enlarged spleen. The first three of these symptoms are always present; the enlargement of the spleen is also constant, but cannot always be detected. In acute cases the enlargement may not be discovered because it diminishes rapidly after the paroxysm is over. The quotidian is by far the most common type of the disease in the young child. Of the 576 cases upon which the study is based, 456 were quotidian, 84 tertian, 7 double quotidian, and 17 remittent. In 3 the paroxysm recurred upon the seventh day; 1 was quartan, 3 were recorded as "dumb ague," and 5 as cases of chronic malarial poisoning. He believes that the feeble resisting power of the infant accounts for the frequency of the quotidian type, rather than the double infection theory of Thayer. The double quotidian type is quite rare, and of the 7 cases recorded all were in very young children, the oldest of whom was only two years of age. A curious association of types occurred in a breast-fed baby, aged fifteen months, and its mother, the child having a quartan type while the mother was ill with the tertian variety.

The chill occurs in the young child with somewhat more relative frequency than is commonly supposed, according to the author's statistics. Of 504 cases below the age of five years, 25, or about 1 in every 20 cases, were ushered in with a chill; 27 were taken ill with a convulsion. Chill occurred in 1 case each at four months, eight months, and ten months of age; in 4 cases between one and two years; in 6 cases between two and three years; in 5 cases between three and four years, and in 7 cases between four and five years. Thus the fact is emphasized that the older the child the more apt it is to have a well-marked chill.

Convulsions occurred in 27 of the 504 cases below five years of age, and of this number 23 were between six months and three years, while the remaining 4 were between three and six years of age, showing that the older the child the less apt is a convulsion to occur. Fifteen of the 23 cases were in children below the age of two years, and 7 were in infants below the age of thirteen months, so that the tendency to convulsions is about equally strong for each of the first three years of life.

In the ordinary type of the disease the symptoms are, in the main, convulsions, a cold, pale face, nausea and vomiting, feeble pulse, trembling taking the place of a chill, and followed by high fever and great anæmia. Often the clinical diagnosis must be made on the periodical return of a high fever with or without the presence of an enlarged spleen, all other symptoms being absent. Malarial torticollis was found in eight cases and malarial chorea in ten cases. Diarrhœa of periodic type occurred in ten cases.

Repeated Lumbar Puncture in Cerebro-spinal Meningitis.—KOPLIK (*Medical News*, 1891, No. 1471) reports a series of five cases of cerebro-spinal meningitis due to the meningococcus, in which repeated lumbar puncture was practised. Fifteen punctures in all were made, as early as the fifth and as late as the thirty-seventh day of the disease. Four of the five cases recovered, the fatal case occurring in an infant, aged eight months.

The indications for puncture were continuous headache, accompanied by somnolence and delirium, chills, sharp rise in temperature, increase in opisthotonos, and coma. If improvement followed puncture the operation was repeated as the symptoms increased again in severity.

The benefit of this plan of treatment seems to lie in a diminution of pain and a reduction of the symptoms due to toxæmia and mechanical pressure. The withdrawal of an appreciable amount of fluid from the spinal canal which contains bacteria and the toxic products of inflammation must be beneficial, in the long run, on the course of the disease. As a curative method it seems destined to rank with aspiration of the pleural cavity.

A French View of Infantile Scurvy.—Rather remarkable conclusions in regard to the etiology and pathology of infantile scurvy as observed in France are given in a recent Paris thesis by PAUGAM (*Contribution à l'étude de la maladie de Barlow en France*, Paris, 1901). According to this author the disease is very rare in France, and results from the use of milk modified in various ways and especially "maternized milk" (seven out of eleven cases). Sterilized milk, he states, does not come under the title of a modified milk. The disease has no definite clinical picture, and the grave hemorrhagic form often described by foreign writers is exceedingly rare. Scurvy always occurs, in this writer's opinion, in patients with rhachitis, either evident or latent—a theory that can no longer be accepted for American cases, at least.

Clinical, anatomo-pathological, and pathogenic study of this syndrome leads the author to conclude that Barlow's disease is a form of rhachitis, an exaggeration of the congestive process of rickets with hemorrhagic tendencies.

The prophylactic treatment of rickets is to be instituted; modified milks and alimentary specialties are to be avoided.

In case of existent disease a well-ordered alimentary regimen makes the symptoms disappear. Antiscorbutic remedies are only adjuvants, and do not constitute a specific medication.

[Infantile scurvy is so well understood by both American and English writers that comment on this author's conclusions seems unnecessary.—ED.]

Prophylactic Injections of Diphtheria Antitoxin.—At a recent meeting of the Société de Pédiatrie (Séance, June 11, 1901; *Revue mensuelle des Maladies de l'Enfance*, July, 1901, p. 335) AUSSET discussed this question and declared himself in favor of it. He cited the case of a family in which diphtheria developed. Of two other children one was sent to the country, the other, an infant, aged eleven months, nursed by his mother, received a prophylactic injection of serum. This child escaped the disease, while the one who had been sent away developed diphtheritic angina complicated by a suppurative otitis. The speaker was convinced that the attack would have been avoided had a preventive injection been given.

BARBIER was also in favor of such injections in families in which diphtheria was declared, but since the time of immunity is uncertain it is important to keep such children under observation for some time.

NETTER had collected 32,484 observations of prophylactic injections. Of this number it was noted that, after elimination of the cases in which the disease developed in less than twenty-four hours after the injection, or more than thirty days after, there were 192 cases in which diphtheria developed in spite of the preventive injection—a proportion of 6 per cent. of failures.

On the other hand, Netter has recently made ninety preventive injections, with two failures—a proportion of 2.17 per cent.; while of twenty-five children simply isolated without receiving the serum, three developed the disease—a proportion of 12 per cent.

COMBY and SEVESTRE also testified to the value of prophylactic injections in controlling the spread of the disease. In terminating the discussion the following resolution was adopted:

The Société de Pédiatrie affirms that preventive inoculations present no serious dangers and confer immunity in the great majority of cases for some weeks. It recommends their employment in children's institutions and in families where scientific surveillance cannot be exercised.

Leucocytosis in Measles.—RENAUD in a recent thesis (*La leucocytose dans la rougeole*, Thèse de Lausanne, Paris, 1900) presents interesting conclusions as to the condition of the blood during the activity of the measles infection.

Fourteen days before the appearance of the exanthem the blood is normal, which corresponds with what might be expected at the moment or even just before the beginning of the incubative stage.

During the incubative period there begins a relative as well as absolute increase in the polynuclear leucocytes, with an absolute increase, though relative decrease, of the lymphocytes. In one observation, for example, the number of leucocytes was 16,200 above the normal, and of this number 13,268 belonged to the polynuclear group, the remainder to the lymphocytes. As the lymphocytes formed only 21 per cent. of the leucocytes, it is evident that during the period of incubation the increase of leucocytes is especially due to the polynuclear group.

This pre-eruptive hyperleucocytosis commences at the beginning of the period of incubation, increases rapidly, and reaches its maximum about the sixth day before the appearance of the eruption, but from this time on it diminishes.

Examination of the blood during the period of the enanthem shows that in normal cases there now occurs a fall in the proportion of the polynuclears, while in those cases which are or will be complicated by another affection this fall is not observed. This fact is of decided importance in the prognosis.

At the same time that, during the enanthem in normal cases, the polynuclear neutrophiles diminish, myeloplaques appear, and there is a slight increase in the lymphocytes.

The eruptive stage is characterized by hypoleucocytosis due to a constant diminution, absolute and relative, of the polynuclears, with increase (sometimes relative only) of lymphocytes and myeloplaques. The eosinophiles disappear. This hypoleucocytosis generally reaches its maximum on the second day, about twenty-four hours after the beginning of this period. The number of leucocytes is then reduced about half, and this is at the expense of the polynuclear neutrophiles. From this point, however, leucocytosis increases more or less rapidly after the disappearance of the exanthem, reaching its normal level from one to five days (generally the second) after the disappearance of the rash, provided no complications interfere.

In complicated cases, however, with the general increase there is also an increase, absolute and relative, in the polynuclears; the absolute number of lymphocytes also increases, but less markedly. In these cases the myeloplaques remain in the blood, and numerous eosinophiles appear. Finally, during the post-eruptive period if there are complications there is a hyperleucocytosis, the increase depending upon the polynuclears, which sometimes are alone responsible for it.

These modifications in the elements of the blood are of considerable importance in both diagnosis and prognosis. Quite recently Meunier has called attention to a symptom of the incubative stage which he calls the "premorbillous loss," and which consists in a diminution of weight of about 50 grammes per day, beginning on the fourth or fifth day after infection, and reaching a total of about 300 grammes. An examination of the blood at this time, therefore, furnishes another early diagnostic sign, which is at least as important as that of Meunier. This sign, as already indicated, is a hyperleucocytosis which begins with the infection, and increases rapidly, reaching a maximum eight or nine days before the appearance of the exanthem, and, therefore, four or five days before the period of contagiousness. If this phenomenon of hyperleucocytosis be sought for among children who have been exposed to the contagion, a diagnosis may be made during the incubative stage and before the case becomes infective to others, thus permitting of early isolation and stamping out of the epidemic.

In differential diagnosis during the period of the exanthem, when the rash may be mistaken for various toxic infections or drug eruptions, it must be remembered that none of these affections is accompanied by hypoleucocytosis, or even that increase in the number of white corpuscles is to be observed, the exanthem following injection of antidiphtheritic serum, for example, being accompanied by a polynuclear hyperleucocytosis. The diagnosis from urticaria or syphilitic roseola may be clinically very difficult, but these affections are not accompanied by hypoleucocytosis. It is only in rare cases that the diagnosis of measles from scarlatina may be difficult, but, according to hæmatologists (among them Türck) who have studied the latter disease, there is a hyperleucocytosis, with increase of eosinophiles—a phenomenon quite the reverse of that observed in the eruptive stage of measles.

As an aid to prognosis, it has been shown that in the eruptive period a slight hypoleucocytosis which rapidly changes to a hyperleucocytosis is an indication of a present or approaching complication. This reaction is very delicate, since so slight a complication as a panaris, a conjunctivitis, or a simple bronchitis is announced by a more or less considerable increase in the leucocytes. In grave complications, such as suppurative otitis, bronchopneumonia, or tuberculosis, this hyperleucocytosis is very marked. During the period of desquamation, when naturally the leucocytosis returns to normal, the hyperleucocytosis of complications persists as long as the organism is able to resist. Rapid fall in the count at such a time is of grave import, as is also the continuance of the hypoleucocytosis, in the presence of a complication, after the time that a return to a normal count should be expected.

It may be added that this law does not apply to affections normally accompanied by hyperleucocytosis, such as typhoid, malaria, and acute and generalized septicæmia, which, however, are extremely rare complications of measles.

THERAPEUTICS.

UNDER THE CHARGE OF

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Diuretic Action of Caffeine and Theobromine.—DR. HENRI ANTEN, in an extended research on the kidney functions relative to diuretics, and more particularly limited to the study of the xanthin diuretics (caffeine and theobromine), gives the following general conclusions: 1. Uric acid and probably urea also are for the greater part, if not exclusively, excreted by the epithelium of the convoluted tubules of the ascending loop of Henle. 2. Caffeine can, under certain conditions, act as a diuretic in the dog. Its habitual inactivity in this animal may be considered to be an evidence of the inhibitory action which the vagus has over the renal secretion, and which action is exaggerated by the use of caffeine. 3. Irritation of the vagus, in the neck, or in the cardiac region suspends the renal secretory action, not, as Walravens maintains, by an arrest of the heart's action, nor yet as Masius supposes, and as Corin seems to admit, by vaso-constrictive action, but such suppression is due to a direct action exercised on the secretory tissue of the kidney. 4. Theobromine acts as a diuretic in the dog. 5. The xanthin diuretics, in contradistinction to the saline diuretics, which at the same time, while stimulating the action of the liver and kidney, also stimulate the secretion of the lymph, do not possess any lymph stimulating action. 6. There does not seem to exist any relationship between the degree of solubility, the character of dissolution, and the diuretic activity of the xanthin bodies. This is a view contrary to that held by Von Aubel and by Corin. 7. The xanthin diuretics are direct stimulants of the renal epithelium. Contrasted with the saline diuretics, which seem to be able at the same time to increase the elimination of water and also of salts, especially of the chlorides, the xanthin diuretics seem to favor the elimination of nitrogenous substances, notably urea and uric acid. Inasmuch as these are secreted by means of the epithelium of the convoluted tubules, the xanthin diuretics, therefore, act more particularly on the epithelium.—*Archives Internationelles de Pharmacodynamie et de Therapie*, 1901, vol. viii. p. 455.

Santonin in Locomotor Ataxia.—DR. E. NEGRO has found that santonin in three doses of five grains at three-hour intervals in eleven patients experimented on gave relief in eight, temporarily relieved two, and did not affect one. The routine of giving ten grains as an initial dose and five grains five hours later was adopted. The santonin was administered in the crises only. The pain was relieved in from two to three hours after the initial dosage, and disappeared entirely after a further dose.—*Giornale della Reale Accademia di Medicina di Torino*, 1901, vol. xvii. p. 47.

Intramuscular Injections of Calomel for Gonorrhœal Rheumatism.—DR. M. THOMAS, in a short note, after reciting many of the disappointments in methods used to treat (so-called) gonorrhœal rheumatism, advocates the employment of intramuscular injections of calomel. He has amplified the method of Gorsse, and injects into the body of the larger muscles one-half grain of calomel at intervals of from two to four days. He has not encountered any disadvantageous symptoms. As yet the method has had but limited practical application.—*Le Mois Thérapeutique*, 1901, vol. ii. p. 59.

Sodium Cacodylate in Tuberculosis.—DR. PAUL DE LANGENHAGEN reports on the use of this drug, which, by means of its greatly diminished toxicity, permitted of the use of large doses of arsenic, in eight instances of pulmonary tuberculosis. In four of the patients the symptoms indicated a slight involvement only. These showed symptoms of improvement within three to four months. In three of the patients in whom cavity formation, fever, and loss of flesh and strength were extreme, the fever diminished, the pulmonary condition was much improved, and in five months there was marked gain in weight. In one patient *in extremis* the result was negative. —*Hospitalstidende*, 1901, vol. viii. p. 1169.

Phthisis Treated with Duotal.—DR. H. HOLSTI reports on the use of duotal in eleven patients in the clinic at Helsingfors. In the beginning of the treatment the doses were eight grains thrice daily. Later these doses were reduced, so that one and one-half grains were administered, with gradual increase in dosage. In one instance only was there any change for the better in the general condition of the patient. This, however, was not more marked than in many other patients placed under hygienic treatment. In those cases in which dyspeptic symptoms were prominent, the use of duotal was distinctly disadvantageous. The author's conclusion is that the remedy is worthless for phthisis.—*Finska läk. handlung*, 1901, vol. xlii. p. 1080.

Zomotherapy in Phthisis.—DR. L. ROBINSON considers in detail some of the work of Robin and Binet on respiratory exchange, and brings into prominence the investigations of Richet and Héricourt on the use of raw meat (zomotherapy) in the treatment of tuberculosis. These investigators have shown that cooked meat is very different from raw meat, and that meat deprived of its serum is of but mediocre value, and that muscle serum is as efficacious as the raw meat from which it is expressed. The muscle serum, it is claimed, is antitoxic to the toxin of the tubercle bacillus.—*The Practitioner*, 1901, vol. lxvii. p. 102.

[The hypotheses discussed are ingenious but fragmentary.—R. W. W.]

Lupus and Urea.—DR. A. H. BUCK, following the suggestion of Harper that urea was useful in the treatment of tuberculosis, has tried this remedy in lupus with satisfactory results. The disease commenced at the age of twenty-four, at first in the upper lip and side of the nose. After ten years the lesion was so extensive that operation was deemed inexpedient. After twelve years, the time of the beginning of the use of urea, the patient was horribly disfigured, little of the normal contour of the face being intact. In March of the present year urea in twenty-grain doses was given thrice daily. This dose was increased to thirty and forty and even to sixty grains thrice daily. Healing of the ulcers soon commenced, and reparation was soon well advanced almost to completion. Two months later the nodules had entirely disappeared, the discharge from the nasal cavity had ceased, and all acute manifestations had subsided.—*The Practitioner*, 1901, vol. lxvii. p. 140.

[The history of this case is distinctly noteworthy, and continued experimentation along this line is desirable.—R. W. W.]

Antityphoid Serum.—DR. E. W. AINLEY WALKER contributes an important series of observations bearing on the experimental side of the question of the value of antityphoid serum. Ehrlich was perhaps the first observer to clearly enunciate the proposition that a difference in the species between the animal immunized and the animal to be protected or cured formed a barrier to success of the gravest importance in the production of antityphoid, antistreptococcic, antipneumococcic, and other antimicrobic serums. Certain important facts are well established which lend much support to this view, yet it is not by any means certain that the difficulties are to be attributed to the differences of the species. In the study of the different serums certain fundamental distinctions of the character of the etiological factor should constantly be borne in mind. Again, different animals vary in their susceptibility to any given organism, and it is evident that the serum of a less susceptible animal artificially immunized against that organism will be less protective than that of a more susceptible animal brought to the same degree of immunization. The author has set out to show just what these variations are, and to point out, if possible, what factors are concerned in the phenomenon of immunity. He brings out clearly the necessity of recognizing the differences between an antimicrobial and an antitoxic serum. The former has a bactericidal action, the latter none. The former also may have antitoxic power—that is, as far as the anticholeraic serum is concerned. With reference to the antityphoid serum the evidence is not as convincing. The author states, however, that there is sufficient evidence to show: 1. That such a serum can be obtained by immunizing horses against the bacillus typhosus. 2. The initial stages of the process may be shortened by using the method of Bokenham. 3. A high degree of immunization must be obtained, and the employment of living cultures in the later stages is desirable. 4. The serum must be made widely polyvalent by the use of as many and as largely different races of typhoid bacilli as is practicable. 5. The relative value of the serum obtained may be determined by a determination of its relative agglutinative power. 6. It is open to question whether the efficiency of the serum might not be further increased by immunization of the horses against *bacillus coli communis* also, or by the addition to the serum of a certain proportion of anticoli serum from a horse treated with that organism.—*Journal of Pathology and Bacteriology*, 1901, vol. vii. p. 250.

Intestinal Lithiasis.—DR. LOUIS VIBERT discusses the occurrence of this affection under two forms: 1. Those forms of calculi which do not originate within the intestinal canal, such as pancreatic or biliary calculi, grains and seeds of fruit, débris of food, calculi derived from fistulas of the bladder or vagina, and, rarely, medicinal powder concretions, chalk, etc. 2. Those originating in the intestinal canal, existing either in the form of intestinal sand or as well-matured calculi. Treatment should be directed toward curing the actual attack as well as toward preventing the recurrence of the trouble. As colic is the most pressing symptom calling for relief, here hot water applications externally with opiates and belladonna are indicated. Enteroclysis is also called for. As far as prophylaxis is concerned dietetic regulation is paramount. Constipation should be regulated, vegetables interdicted, as they seem to form the nucleus for the sand or calculi, and intestinal antiseptics, such as beta-naphtol, administered regularly. Mineral waters are advised, particularly those rich in magnesium chloride. Such are Chatel-Guyon, Vichy, and Vittel.—*Revue de Thérapeutique*, 1901, vol. lxviii. p. 397.

Treatment of Typhoid Fever.—DR. JAMES STEWART reports typhoid fever treated in the Royal Victoria Hospital, Montreal, for the seven years since its opening to the present. During this time six hundred and twenty patients suffering from typhoid were admitted, of whom thirty-four died, an average of 5.4 per cent. Of these, eleven died from perforation, ten from intoxication, and nine from hemorrhage. Cholecystitis, bronchopneumonia, septic pyæmia, and abdominal distention each caused one death. Since the opening of the hospital the routine treatment has been hydrotherapy save in a few contraindicated cases. The first bath administered is at a temperature cooled from 90° to 80° F. for ten minutes. The second is at a temperature of from 85° to 75° for a similar period; and the third is at the same temperature for fifteen minutes. The fourth and subsequent baths are given at 80° F., quickly lowered to 70° F. for a period of fifteen minutes. The usual precautions relative to friction, etc., are taken. The bath is given every third hour while the temperature is above 102.4° F. Bathing was resorted to throughout the entire course of the disease in 83 per cent. of the cases.—*British Medical Journal,* 1901, No. 2111, p. 1463.

[The frequency of perforation in typhoid fever when treated by hydrotherapy is emphasized by almost every series of cases. If the modern theory of hydrotherapy is correct ten deaths from intoxication point either to incorrect or inefficient practice. Even this mortality is altogether too high. —R. W. W.]

Cinnamon in Influenza.—DR. J. C. ROSS concludes, after a careful series of observations made during the past five years, that cinnamon if used promptly and thoroughly will cure most cases of influenza in a comparatively short time. Decoction of cinnamon or "tabloids" of it are recommended as desirable forms to take the remedy. The dosage is not given.—*British Medical Journal,* 1901, No. 2110, p. 1403.

Hæmaturia following the Use of Urotropin.—DR. W. LANGDON BROWN reports two cases of hæmaturia resulting from the use of urotropin in which doses of ten grains thrice daily were given. Both occurred in subjects with typhoid fever. In the first case a male, aged thirty-three years, was given ten grains thrice daily for two days. The patient was then probably ill some weeks. Two days after beginning medication pain and difficulty in micturition were observed, and hæmaturia with scanty urine became established. Cessation of the drug was followed by the clearing up of the urine. In the second instance, a patient, aged twenty-four years, was in the second or third week of typhoid, but had been in bed but two days. Ten grains of urotropin were given thrice daily, and the next day blood appeared in the urine. Withdrawal of the drug was followed by a cessation of symptoms. Discomfort on urination is noted as a danger signal. The complication is recorded as an interesting though probably not a common condition.—*British Medical Journal,* 1901, No. 2111, p. 1472.

Fatal Sulphonal Poisoning.—DR. HENRY WALDO reports the instance of a male, aged thirty-three years, without occupation, who fancied he was a bad sleeper and had acquired a habit of taking hypnotics, chiefly sulphonal. He developed a peculiar condition of delirium, with pain and tenderness over the abdomen, nausea, vomiting, and constipation. A few days from the onset of his illness the urine became cherry-red and smelling like celery. The spectroscope showed the presence of hæmatoporphyrin. The patient gradually failed, became demented, resembling the terminal stage of paresis, and finally died with general convulsions, which were epileptic-like in character. In all, the patient was ill about twenty-four days—ten days with gastritic irritability and two weeks with cerebro-spinal symptoms and progressive toxic paresis.—*British Medical Journal,* 1901, No. 2111, p. 1473.

OBSTETRICS.

UNDER THE CHARGE OF

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Eclampsia and the Thyroid Gland.—NICHOLSON, of Edinburgh, recently read a paper upon this subject before the Edinburgh Obstetrical Society, published in full in the *Scottish Medical and Surgical Journal,* June, 1901. The discussion upon the paper appears in the *Scottish Medical and Surgical Journal,* July, 1901. In the paper the author discusses the changes in the blood and circulation during pregnancy, drawing attention to the fact that there is always a toxæmia as the result of fœtal metabolism. There is during pregnancy increased vascular tension, due to hypertrophy of the cardiac muscle and the muscular coat of the vessels. Each pregnant patient, especially in her first pregnancy, is in a condition of toxæmia where the balance is easily disturbed and a dangerous condition might readily arise.

He believes that there is an intimate relation between inadequate function of the thyroid gland and the mechanism which arrests the renal secretion. During pregnancy hypertrophy of the thyroid is usual. In twenty-five pregnancies in which the usual hypertrophy was absent Lange found albuminuria in twenty. Thyroidin has a marked diuretic effect, but does not greatly diminish albuminuria. The writer cited the case of a multipara who had eclamptic convulsions and who was cured by the administration of thyroid, going to term and giving birth to a healthy living child. He drew attention to the fact that when the thyroid does not perform its function urea is not properly formed, and the action of the kidneys is deficient. He thought that eclampsia often resulted from substances produced in the liver which form in that organ because the thyroid does not act properly.

In treating eclampsia and the pre-eclamptic state by thyroid extract he would give five-grain doses night and morning, and after a few days three times daily. Proteid food should be entirely forbidden at first and very gradually resumed. When signs of eclampsia appear and a fit seems imminent, ten or fifteen minims of thyroid liquid should be injected hypodermically every hour or two. The fresh juice of a sheep's thyroid, ten minims with an equal quantity of distilled water, is more efficient. For the immediate treatment of the convulsion he would give one-half grain of morphine. He thought well of saline transfusion in connection with thyroid and morphine.

In the discussion of the paper Underhill remarked that if thyroid deficiency were the cause eclampsia should be seen more frequently. The thyroid theory did not account for the frequency of eclampsia in primiparæ. Hart recalled the cases of two myxœdematous women who had borne children and who had no eclampsia. On the contrary, they actually improved in condition during their pregnancy, probably owing to the action of the fœtal thyroid. He also reported experiments made on bitches in removing the thyroid while they were pregnant. Hart did not believe that the thyroid theory was sufficient to account for eclampsia. Haultain thought the most important point in the paper was that regarding increased arterial tension. Whatever causes eclampsia does so by bringing about this abnormal tension. Iodothyrin should be given a fair trial, as it may be found efficient in counteracting the effect of the toxins and dilating the vessels. Ballantyne stated that the last case of eclampsia narrated in the paper was under his own care. The apparent effect of the thyroid in this case was striking. He had found it a difficult matter to decide whether the thyroid was enlarged or not during pregnancy. In the Edinburgh Maternity Hospital the number of cases of eclampsia was remarkably large.

Bacteria in the Feces of Newborn Infants.—HELLSTRÖM publishes in the *Archiv für Gynäkologie*, 1901, Band lxiii., Heft 3, the results of interesting studies in the clinic at Helsingfors regarding the presence of bacteria in the feces of newborn infants. From his studies he concludes that the bacillus coli communis and lactic bacterium develop rapidly and freely in the infant's intestines during the first days after birth. This is possible, because there is in the intestine at this time a greater quantity of material on which these germs can live, and the acid reaction of the feces has not yet become established. After the fourth day the number of bacteria steadily decreases. Many of the germs seen upon examining such specimens are dead bacteria which have been in the intestine during intra-uterine life. They are the colon bacillus and the lactic bacillus.

Sterilization of the Hands and Puerperal Morbidity.—STICHER (*Zeitschrift für Geburtshülfe und Gynäkologie*, 1901, Band xlv., Heft 3) reports the results which he has observed in the Breslau clinic in sterilizing the hands and the results obtained from various methods upon the puerperal morbidity of the clinic. He describes in detail the antiseptic methods of the clinic, which do not differ essentially from those in common use. Vaginal examinations are limited as much as possible; green soap, bichloride, and lysol are plentifully used, and the technique is that commonly seen in all well-managed clinics. He used sterile gloves for some time in the work of the clinic, but did not observe that their introduction was followed by any special improvement in the course of cases. He finds that such operations as manual removal of the placenta, rapid delivery which tears the cervix; difficult labor attended by extensive lacerations, and in general such operations as bruise and wound the tissues are followed, in spite of antiseptic precautions, by some elevation of temperature. It is evident to him that not only is the sterility of hands and instruments of importance, but in a large percentage of cases in which the temperature rises the patient herself contains within her body the cause of the fever. He draws attention to the many opportunities for the introduction of bacteria into the genital canal through bathing, the passage of urine, the giving of rectal injections, vaginal examinations although the fingers be sterile, and infected amniotic liquid.

It is his experience that preliminary cleansing of the genital tract should be limited to cases in which a pathological process is evidently present. In sound and healthy women whose secretions are presumably healthy he does not practice such interference.

A competent obstetric antisepsis obliges the practitioner not only to be aseptic in his hands and instruments, but also to study carefully each patient to detect a septic condition in the genital canal. Obstetric operations should be so conducted as to produce the least possible traumatism.

Bacteriological Examination of the Contents of Pemphigus Vesicles in the Newborn.—A further contribution to the pathology of infancy is made from the Helsingfors clinic by BERGHOLM (*Archiv für Gynäkologie*, 1901, Band lxiii., Heft 3.) He made culture examinations of the contents of pemphigus vesicles in cases of disease in the newborn. He readily obtained numerous bacteria, diplococci in chains. Of these he made cultures and inoculated mice with the cultures. Most of the animals died as the result of the inoculation, but one developed an eruption upon the skin. He reviews the various examinations which have been made, adding his own report to them.

The Second Stage of Placental Development.—VAN TUSSENBROEK, of Amsterdam, describes (*Zeitschrift für Geburtshülfe und Gynäkologie*, 1901, Band xlv., Heft 3) a uterus in early pregnancy obtained by operation, in which the development of the placenta was studied. From this examination it is concluded that the development of the placenta, from the primitive to the discoid form, is complete at the sixth month of pregnancy. The uterine decidua has entirely disappeared at this time, as the result of mechanical pressure. The villi are obliterated by the disappearance of the intervillous spaces between the chorion and uterine decidua. The circulation of the embryo does not come into actual contact with the chorion. The placenta is spread out as it grows through the mobility and change in the uterine decidua. When this disappears and the chorion joins with the ovular decidua, the placental decidua grows at the same rate as that of the uterine wall. The cotyledons of the placenta are formed by the superficial layer of the placental decidua as it expands under an unequal resistance, which is greatest near the bloodvessels. This brings the small vessels to the apex of the villi, and results in the arrangement seen in the circulation. The trophoblast can be plainly distinguished from the decidua. Langhan's layer has disappeared, its cells mixing with those of the syncytium.

Pregnancy and Ventral Fixation.—In the *American Journal of Obstetrics*, July, 1901, DICKINSON contributes a paper upon this subject, and reviews its literature.

His first case was that of a multipara who had ventral fixation, shortening of the round ligaments with plastic operation upon the vagina. At labor a tumor was said to obstruct delivery, and version and perhaps embryotomy were done. After the patient had been septic for three weeks she was sent to Dickinson's service at the hospital. She then had peritonitis with extensive exudate surrounding a laceration on the right side, the rent in the uterus running from the external os to the cornu, and splitting the broad ligament. The fundus was fixed to a scar above the pubes, the posterior wall was thin and relaxed. The anterior wall was two inches thick, and ran from the top of the scar half-way back across the pelvis. The patient did not rally.

His second patient was a delicate woman, who had ventral suspension and removal of a cyst from the ovary. Conception occurred shortly after marriage, and the patient suffered from nausea and toxæmia. On examination the right horn of the uterus was thrown forward, and the vaginal portion of the cervix was in front of the promontory. As the patient did not come into labor spontaneously, she was anæsthetized and examined, when the left ovary and round ligament were found at Poupart's ligament. The external os was found crowded against the middle of the first sacral vertebra. An effort was made to pull down the cervix and to bring on labor by dilating the os. It was impossible to reach the internal os, and dilators could not be inserted. Cæsarean section was performed and the mother delivered of living twins. The mother died of shock twelve hours after the operation.

The Treatment of Pruritus Vulvæ.—SIEBOURG (*Centralblatt für Gynäkologie*, 1901, No. 26) has treated cases of pruritus vulvæ by the application of an ointment of cocaine, orthoform, menthol, carbolic acid, and vaseline, with good results in some cases. He has used all of the substances recommended and with varying success. In the most intractable cases he has had good results by injecting sterile salt solution in the vicinity of the parts and also by using cold applications and subcutaneous injections of dilute solutions of cocaine and carbolic acid. In using salt solution one-third of a quart was injected, and sufficient distention of the tissues produced to raise the skin from the underlying tissue to a considerable extent. He has succeeded in this way in curing some intractable cases.

Latent Infection of the Endometrium in Pregnancy, Causing Puerperal Septic Infection.—ALBERT, from the Dresden clinic, contributes a very interesting and important paper upon this subject in the *Archiv für Gynäkologie*, 1901, Band lxiii., Heft 3. He reports two cases, as follows:

The first was a primipara, seven months advanced. Labor pains came on, followed by chill, fever, and the discharge of foul amniotic liquid. These phenomena were repeated, and the patient became eclamptic. She died undelivered. Post-mortem examination showed an area of infection at the fundus of the uterus, with the formation of pus separating the membranes from the wall of the womb. The placenta was infiltrated with pus, and the wall of the uterus unchanged. The phenomena of general septic infection were found throughout the body. The original focus could not be discovered. Cultures were not taken, but a streptococcus mixed infection was undoubtedly present.

His second case was a primipara near term, brought to the hospital in labor, with the history of feeling ill and depressed for a number of days, and having had several chills. A midwife had made one examination just before admission. Labor proceeded spontaneously, and a dead child was soon born. The patient died of acute sepsis forty-two hours after admission. Upon autopsy abscess in the wall of the uterus, septic infection of the tubes and ovaries, and general sepsis were found.

Albert reviews the literature relating to the condition of the genital tract as regards the presence of bacteria, and from his cases and from the literature concludes as follows: Bacteria are found in the vagina in all cases in health as well as in disease. When any form of bacteria known to be pathogenic is discovered, the patient must be regarded as infected. At any time in life, especially after the beginning of menstruation, the cervix and cavity of the uterus may become infected. In many cases this infection is brief and mild, and during a latent infection of the mucous membrane of the uterus conception may occur. Many abortions and premature labors followed by septic phenomena are due to this condition. Adhesion of the placenta, nephritis, and, in some cases, eclampsia may be referred to such infection. As ordinarily carried out, our prophylaxis of puerperal fever begins too late to be effective.

As prophylactic measures of value, he suggests the use of clothing which shall entirely cover the vulva and prevent entrance of germs during the motions of the patient. Abnormal discharges from the genital canal, attended with abnormalities of menstruation, should receive attention. During pregnancy we should correct abnormal discharges as far as possible, if necessary putting the patient in bed for this purpose. The same antiseptic precautions should be observed in private houses during labor which are carried out in hospitals. In the puerperal period the patient should be kept at rest sufficiently long to enable her to thoroughly recover with a well-contracted uterus. She should be so placed in bed as to further drainage of the lochial discharge. Care should be taken that retroflexion of the uterus does not occur, which will favor the retention of the secretion.

To the foregoing the reviewer adds the case of a multipara eight months advanced in pregnancy, who had a periodical discharge of fluid from the uterus. She was admitted to the hospital when labor came on, and a premature child was spontaneously born, and survived. The mother had a mild septic infection, from which she readily recovered after the uterus was thoroughly cleansed.

On examining the placenta and membranes septic infection of considerable duration was found to have been present before labor. Several varieties of bacteria were isolated from the membranes, and cultures made. Microscopical study of the specimens showed the characteristic phenomena of infection.

There was no evidence of syphilis or of gonorrhœa. The patient lived amid poor surroundings, worked hard, and was poorly nourished.

The Influence Upon the Fœtus of the Maternal Treatment of Syphilis.—In the *Wiener klinische Wochenschrift*, 1901, No. 26, RIEHL contributes a paper upon the treatment of syphilis in the pregnant patient with the results of such treatment upon mother and child. He quotes the statistics of various writers, which show a mortality for the fœtus where the mother is not treated of nearly 100 per cent. Where treatment is carried out through several weeks the fœtal mortality falls to 97 per cent., and where maternal treatment is continued during months but 76 per cent. of children are lost. Ordinary syphilis in the pregnant woman is treated by mercurial inunction, by mercury given by the stomach, and by iodide of potassium.

With a view of influencing the fœtus and checking syphilitic changes in the uterus, Riehl treated a number of syphilitic pregnant patients by vaginal capsules containing fifteen grains of mercurial ointment with cocoa butter. These capsules were kept in place by a tampon of cotton or gauze. He continued in many cases the ordinary treatment of syphilis. Whenever possible he made this the only treatment. He describes the case of a woman who became syphilitic and aborted twice, and had the characteristic lesions. Under the treatment described she passed through pregnancy and gave birth to a normal child. In all he treated by this method thirty-three patients, with the result of abortion in 3 per cent.; premature labor in 9 per cent., and labor at full term in 88 per cent. Of the children, 6 per cent. were stillborn; 6 per cent. were syphilitic, and 88 per cent. were apparently healthy. The total fœtal mortality was 12 per cent., and the total fœtal morbidity was 21 per cent.

Three Cæsarean Sections in the Same Patient.—COAKLEY (*Journal of the American Medical Association*, June 29, 1901) reports three Cæsarean sections upon a patient having a contracted pelvis whose true conjugate was but two and a half inches. After losing three children the mother consented to operation. During the patient's seventh and last pregnancy she developed toxæmia which required treatment. The operation was rapidly performed, and consisted of incision of the abdomen, incision of the uterus, and closure by suture.

Two Fatal Cases of Pregnancy Complicated by Mitral Insufficiency.—In the *Boston Medical and Surgical Journal*, July 11, 1901, CHADWICK reports the case of a patient seven months advanced in her second pregnancy. When first seen she had marked dyspnœa and cough, with purulent and bloody expectoration. The heart action was very rapid, and a systolic murmur was transmitted to the axilla. The second pulmonary sound was extenuated. Under rest and tonics she greatly improved, but later œdema developed with toxæmia. She came into labor, and was delivered by forceps. Although very ill after delivery, with threatened heart failure, she gradually improved until the third week, when she died. The urine was scanty in amount, and loaded with albumin before death.

Case second was a primipara, who had a slight systolic murmur when first seen. During pregnancy a troublesome cough developed, with pronounced systolic mitral murmur and extenuation of the second pulmonary sound. In the sixth month of pregnancy her condition was so bad that it was impossible to interfere. She very slightly improved, and finally was delivered of a stillborn child. She did not rally from labor, being mentally and physically greatly depressed, and gradually failed. In both of these cases treatment was followed by very temporary results, and even the termination of pregnancy seemed to be without effect.

Puerperal Phlebitis.—BOSSARD (*La Semaine Médicale*, June 5, 1901) draws attention to the fact that many cases of puerperal phlebitis are preceded by what he describes as benignant pulmonary embolism. The patient complains of very slight distress, has dulness over a portion of the chest, nausea and slight disturbance of circulation, with the development of moist râles and blood-tinged expectoration. The pulmonary signs gradually diminish, followed by the development of thrombosis in the veins of the lower extremities.

He has also observed a family predisposition to this complication, and describes the case of a woman and her two daughters and more distant relations who suffered from this complication. It is impossible to determine the exact germ which produces this condition, and while some cases are violently septic others are certainly not so, and run their course with but very little disturbance.

GYNECOLOGY.

UNDER THE CHARGE OF

HENRY C. COE, M.D.,

OF NEW YORK.

ASSISTED BY

WILLIAM E. STUDDIFORD, M.D.

Recurrence in the Abdominal Cicatrix.—SCHAEFFER (*Centralblatt für Gynäkologie*, 1901, No. 19) reports a case of recurrence of carcinoma in the cicatrix four and one-half years after double ovariotomy for malignant tumor of the ovaries, which he infers was due to inoculation during the operation. Metastasis is much more common after vaginal than abdominal operations. It is rare in the cicatrix after laparotomy, first, because spontaneous metastases seldom or never occur here, and, secondly, because the course of the lymphatics of the ovary is such as to render such metastases improbable. The reported cases of inoculation in the abdominal cicatrix may be divided into four classes, viz.: 1. Recurrence of benign neoplasms after the removal of similar tumors of the ovary. 2. Development of carcinoma following the removal of malignant ovarian growths. 3. Carcinomatous degeneration of the cicatrix accompanying nodules in the peritoneum. In these cases there is probably direct extension of the disease. 4. Cancerous recurrence in the abdominal cicatrix after the removal of cancerous ovaries, the peritoneum being healthy (as in the writer's case and four others). In the first two classes one may infer the development of the secondary growth in consequence of inoculation of the abdominal wound during the operation, though they furnish no positive evidence in favor of the inoculability of cancer.

Emphysema of the Skin Following Cœliotomy.—MADLENER (*Centralblatt für Gynäkologie*, 1901, No. 19) reports four cases, making twenty-five which have been recorded. He believes that the complication is not so rare as is generally believed. It occurs after closure of the abdominal wound by the escape of air from the cavity between the layers of the wall, and has no connection with imperfect closure of the wound. Trendelenburg's posture favors the sucking of air into the cavity, and hence the occurrence of emphysema; hence the importance of lowering the patient to the horizontal position before closing the wound. Treatment is rarely required, though in exceptional cases multiple incisions may be necessary.

[This is certainly an exceedingly rare condition in this country. We have seen but one case, and can recall but two or three reports of others. —ED.]

Antipyrine and Salol as Styptics in Gynecology.—SPAETH (*Centralblatt für Gynäkologie*, 1901, No. 19) used these drugs in seventy cases of uterine hemorrhage with good results. Equal parts are liquefied by heating in a glass vessel, a cotton applicator is dipped in the solution, and the uterine cavity is swabbed out with it three or four times at intervals of from two to four days.

The solution is purely hæmostatic, having no bactericidal action, while cases of glandular endometritis and of gonorrhœal infection were not affected. Hemorrhage due to chronic inflammatory conditions of the adnexa, subinvolution, and abortion were controlled in 80 per cent. of the cases.

The writer infers that the effect of the application is chiefly thermic, and is due to contraction of the uterine muscles, since measurements of the cavity before and after the application showed a variation in depth of nearly half an inch. A slight amount of slough is seen in the cervix, but there is no cauterization of the endometrium. Hemorrhage from polypi and intramural fibroids is not diminished by the treatment; in fact, it is sometimes increased.

Resection of the Urethra in the Female.—DELAGENIÈRE (*Arch. prov. de Chirurgie*, 1900, No. 12) operates as follows: An incision is made around the meatus and is carried downward in the median line one-third of an inch. With blunt dissection either the mucous lining of the urethra or the entire thickness of the canal is freed, drawn outward, and removed above the diseased area. The distal edges are then united to the mucous membrane of the vestibule. If the urethra is prolapsed the incision is S-shaped, the lower half of the S being elliptical. This ellipse is excised with the prolapsed portion of the urethra, the sutures being introduced in the same way. No catheter is left *in situ*, though the patient is catheterized for a day or two.

Pelvic Abscess Communicating with the Bladder.—BAZY (*Revue de Gyn. et de Chir. Abdom.*, 1900, No. 6) arrives at the following conclusions from a study of six cases: Pelvic abscesses adjacent to the bladder should be opened as soon as possible before irritation of the viscus is noted. Vesical irritability in this connection is an indication for immediate interference. After a pelvic abscess has ruptured into the bladder it is unwise to incise it per vaginam, as this may only lead to the development of an intractable vesico-vaginal fistula. If general infection is present or the pus cannot be thoroughly evacuated through the bladder, a vaginal incision is, of course, indicated.

Vesico-intestinal fistulæ following acute inflammatory conditions may heal spontaneously, though cœliotomy may be necessary.

[It is rather peculiar that no mention is made of cystotomy as the most natural method of draining the bladder and preventing infection of the upper urinary tract.—ED.]

Atmokausis.—STÖCKEL (*Therap. Monatshefte; Centralblatt für Gynäkologie*, 1901, No. 19) reports twenty-two cases of atmokausis according to the method of Pincus. He insists on the importance of thorough preliminary dilatation of the cervix, preferably with laminaria tents. In one case the life of the patient (a girl, aged fourteen years, a subject of hæmophilia) was undoubtedly saved by the treatment, though the uterine cavity was obliterated.

It is less apt to be successful in the treatment of hemorrhage due to fibroids, as the entire endometrium is not reached by the steam. In one instance the tumor increased in size after the application. The writer disapproves of atmokausis in cases of hemorrhage due to incomplete abortion. The results are most satisfactory in cases of glandular endometritis and climacteric bleeding.

SIMPSON (*Scottish Medical and Surgical Journal*, 1900, No. 6) treated fourteen cases of uterine hemorrhage by atmokausis, eleven patients being cured and the others relieved. The length of the seance varied from forty to ninety seconds, but the patients were anæsthetized. They were kept in bed from two to three weeks, and no complications were observed.

Injuries to the Vagina during Coitus.—BOHNSTEDT (*Centralblatt für Gynäkologie*, 1901, No. 22) reviews the literature of the subject, giving the details of a case in his own practice, showing that some other etiological factor for rupture of the vault of the vagina during coitus must be inferred, since in 70 per cent. of the reported cases the women were either not virgins or had borne children. If they were due to violence on the part of the male, they ought to be of common occurrence in prostitutes, which is not true. The histories show that in nearly every instance there was marked sexual excitement on the part of the female, which may cause a sudden increase in the intra-abdominal pressure, thus forcing the vaginal vault downward. This question may assume considerable medico-legal importance in cases of supposed rape, from its bearing on the voluntary submission or resistance of the female.

Ureteral Invagination.—GUBAROFF (*Centralblatt für Chirurgie*, 1901, No. 5) reports a case of hysterectomy for fibrosarcoma of the uterus in which an inch of one ureter was excised. The distal end was invaginated into the lower end and was secured with longitudinal sutures, including the entire thickness of the ureteral wall. The patient succumbed from amyloid disease a month after the operation. At the autopsy the calibre of the ureter was found to be normal.

[We have reported a case in which a similar method of repair was adopted, with success, the patient being well two years after the operation.—ED.]

Transplantation of the Ureter into the Rectum.—ALEXANDROW (*Jour. akusch. i. Shensk. Bolesnej.*; *Centralblatt für Gynäkologie*, 1901, No. 23) adopted this plan in the case of a long-standing rectovesical fistula, thirty unsuccessful attempts to close it having been made in the course of seven years. The entire anterior vaginal wall was destroyed and the bladder and portio so embedded in cicatricial tissue that all trace of their former appearance was lost.

Previous to the operation both ureters were catheterized. The abdomen was opened, the peritoneum over the ureters was incised, and the ducts were dissected out, ligated, and divided close to the bladder. The distal ends were then turned into the rectum in the usual manner. The operation was entirely successful.

Conservative Treatment of Diseased Adnexa.—THOMSON (*Centralblatt für Gynäkologie*, 1901, No. 20) is strongly in favor of vaginal section instead of cœliotomy in all cases of abscess of the tube or ovary which can be reached through the posterior fornix. He believes that the most important point is the making of a large incision, followed by thorough evacuation of all the abscesses and free drainage. The results of this treatment are almost invariably satisfactory as regards the relief of pain, diminution of the inflammatory masses, and restoration to comparative health.

The Relation of Nasal to Pelvic Affections.—SCHIFF (*Wiener klinische Wochenschrift*, 1901, No. 3) confirms Fliess' statement that on either side of the nasal septum there are spots which constantly become congested, swollen, and highly sensitive during menstruation. Dysmenorrhœa can often be cut short by cocainizing these localities, and can be permanently relieved by the use of the cautery. The writer reports two hundred observations upon forty-seven subjects. All the women suffered from severe dysmenorrhœa, due in many instances to diseased adnexa. In 72 per cent. cocainization of the "genital spots" in the septum nasi relieved only sacral pains, while similar treatment of the lower muscles of the nose directly influenced pain in the abdomen. Twelve patients were permanently relieved by the use of the cautery.

Two drops of a 20 per cent. solution are applied on cotton. The writer adds that it may be entrusted to a layman (!).

Gynecological Examination from a Medico-legal Stand-point.—CALMANN (*Centralblatt für Gynäkologie*, 1901, No. 20) calls attention to the importance of the fact that on account of the deficiency of the tactile sense in their pelvic organs women are unable to locate the exact spot which is being touched with the finger or an instrument. Hence they are apt to confound catheterization of the urethra, scarification or sounding of the uterus, etc. On the other hand, a sound can be slipped into the uterus without the knowledge of the patient, or her vagina may be distended by a foreign body. This is well known to abortionists. Lesions may be caused by the examining finger in elderly or puerperal women, or deep tears may be produced by specula, all of which may be called to the attention of the medical expert.

Pelvic Hæmatocele Due to General Hyperæmia.—SAUTER (*Zeitschrift für Heilkunde*, Band xxi., Heft 7) admits that while rupture of an ectopic sac is the most frequent, perhaps the sole cause of extensive pelvic hæmatocele, general hyperæmia of the pelvic organs may lead to intraperitoneal hemorrhage. Within three months he found at autopsy seventeen instances of excessive pelvic congestion, in seven of which free blood was found in Douglas' pouch. The only gross pathological change noted was thrombosis of the vessels of the peritoneum, with accompanying connective tissue hyperplasia. This origin of the indurated tissue was proved by microscopical examinations. Perimetric adhesions, he believes, are due not alone to infection (specific or septic), but occasionally to long-standing venous congestion. Clinically it is impossible to recognize this condition, as there are no characteristic symptoms.

OTOLOGY.

UNDER THE CHARGE OF

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Surgical Exposure of the Middle-ear Cavities in Chronic Otorrhœa.—The object of throwing all the middle-ear cavities into one is to bring about an essential or radical cure of the chronic suppuration. Its chief advantage over other forms of mastoid operation lies in the possibility it affords of removing more completely all macroscopically diseased tissue and subsequently to observe directly the exfoliation of those diseased portions not sufficiently demarcated at the time of the operation. "Even in those cases in which a permanent cure of the otorrhœa is not obtained by the operation a prophylaxis is given the patient by reason of the improved drainage afforded by the operation."

PANSE and LEUTERT (*Archiv f. Ohrenh.*, vol. xlv.) maintain that *reinfection* of the cavities operated upon in and about the ears occurs through the Eustachian tube, and, therefore, they endeavor to cause the remnant of the membrana to adhere to the promontory, and thus cut off the passageway from the tube to the drum cavity. The latter advocates the method now adopted in Halle, of obliteration of the tympanic mouth of the Eustachian tube after radical tympanic operations in chronic otorrhœa.

Conical Perforations of the Membrana Tympani in Acute Purulent Otitis Media.—L. KATZ (*Archiv f. Ohrenh.*, December 3, 1900) demonstrates that the conical protuberance on the membrana tympani, marking the position of the perforation in some cases of acute otitis media, consists of densely infiltrated granulation tissue, covered with highly inflamed epidermis, and emanates from the mucosa of the tympanic surface of the membrana tympani. Through the long axis of such a cone runs a narrow canal, lined with a layer of epithelium similar to that covering the outer surface of the cone, showing that the epidermis of the membrana is invaginated into the perforation.

The causes of such a conical formation are: 1. A narrow, high-placed perforation. 2. Rather thick purulent or mucopurulent exudation. 3. A thick, relatively resistant, inflamed cutis layer in the drum-membrane. 4. An inversion of the epithelial edge into the narrow perforation, whereby the latter is still further narrowed.

The difficult escape of thick pus from the drum cavity causes sufficient irritation in the mucous surface of the membrana tympani to induce circumscribed granulation formation, with resultant destruction of the membrana propria at this point. The discharge, however, still finds hinderance to its escape, the yet resistant epidermis layer of the membrana, to cause it to push the latter ahead of it in a hernia-like protrusion. Such a condition tends to further close the narrow exit canal in the cone, and hinders the discharge of pus from the drum cavity.

The formation of such a cone on the membrana tympani in the course of an acute purulent inflammation of the middle ear threatens a retention of pus within the drum cavity, and must receive immediate attention. As soon as observed it should be cut open and dilated, as shown by Schwartze, and this leads in most cases to free outlet and prompt recovery.

In cases in which this method does not give relief to ease pain, fever, etc., if the cone is prominent enough it must be seized with a polypus snare or other suitable instrument, and removed as close to the membrana as possible.

A Case of Agoraphobia Mistaken for Ear-vertigo.—F. KRETSCHMANN (*Archiv f. Ohrenh.*, September 20, 1900, p. 61) reports a case of agoraphobia occurring in one of his patients, a man, aged fifty years, cured eight years before of chronic purulency localized in the attic of the left middle ear. The membrana tympani was destroyed. Vertiginous symptoms had often occurred. After several weeks the suppuration was checked, but the vertigo continued. In the following year the patient's ear was known to have remained healed and his general health had been good. Much to the surprise of Kretschmann the patient suddenly presented himself with his wife, stating that he was unable to walk alone for fear of falling. This condition had occurred suddenly a few weeks previous without any assignable cause, and had grown worse by degrees until its present degree had been reached. An examination of the ear had revealed shining epidermis everywhere, without a trace of pus or the presence of fetor. The patient presented an anxious expression of countenance, his attitude was bent over, and he seemed timid. When he was led through the room he showed no tendency to fall sideways. His gait was sliding, his feet not being lifted. Standing with feet together and eyes closed, there occurred no swaying. The patellar reflexes were normal. In trying to walk alone the patient shoved his left foot carefully forward and then drew the right one after it, like one crossing a narrow foot-bridge. With his hands he quickly sought a support.

In fact, the patient presented well-marked symptoms of ear-vertigo. The patient was assured, however, that his ear was in good condition, there were no signs of a recurrence of the purulency, and that his present condition of vertigo was not due to his ear, but was of a nervous nature. He was also assured that regular exercise would overcome his uncertain gait, and he was immediately told to take several long steps. This succeeded beyond expectation, and he walked better at every repetition of the exercise. Three days later he reported again in high spirits over the good results of his exercises in walking. He held himself erect and walked perfectly well and continued to do so therefrom. The good results in this instance can be ascribed to a form of suggestion or hypnotic treatment.

The Organ of Hearing in Purpura Hemorrhagica.—M. SUGAR (*Archiv f. Ohrenh.*, September 20, 1900), in an article on this subject, rejects the old theory that purpuric affections are due to a dissolution of the blood, and adopts the modern claim that purpura rheumatica and purpura hemorrhagica are of bacillary origin (Kolb, Letzerich, Jarisch *et al.*). He then describes a peculiar ear disease observed by him in a case of peliosis or purpura hemorrhagica in a man, aged twenty-eight years. In this man there was observed at the time of his admission to the hospital, in addition to numerous purpuric spots on the left extensor surface of his lower extremities, a distinct herpetic eruption on the left auricle, the hearing and the membranes on both sides being normal. Two days later there suddenly occurred intense and uncontrollable vomiting, lasting thirteen hours. There was no blood in the vomit. Simultaneously there occurred in the right ear intense tinnitus, accompanied by great vertigo and deafness. Bone conduction was entirely abrogated on the right side of the skull. The next day the right auricle was the seat of twenty-three purpuric eruptions, the face remaining entirely free. Hemorrhagic spots were seen in the external auditory canal, and two upon the membrana tympani near its periphery. After the appearance of this purpuric eruption in the auricle the vomiting, vertigo, tinnitus, and earache ceased, and the bone conduction was reinstated. Three days after this recovery the patient left the hospital, but returned the next day with a relapse in all the symptoms, both general and special. In twenty-four hours the subjective symptoms in the ear and head disappeared once more, the patient, however, remaining very anæmic. Sugar is disposed to attribute all the ear symptoms to hemorrhage into the labyrinth. [It seems, however, to us that a hemorrhage into the labyrinth extensive enough to produce the above-named aural symptoms could not have been absorbed so quickly as this appeared to be, if, in fact, it could ever have been absorbed to a degree sufficient to permit a restoration of hearing.] The treatment recommended in such cases as these consists in iron, quinine, and arsenical preparations.

Otogenous Pyæmia.—F. KRETSCHMANN (*Archiv für Ohrenh.*, September 20, 1900, p. 54) observed three cases of otogenous pyæmia, of which the first was characterized by extensive thrombosis of the cranial sinuses; the second by the rapidity of development of the pyæmia, and the third by the complication of the pyæmia by endocarditis.

In the first case, a man, aged sixty-eight years, subject of chronic purulent otorrhœa, thrombosis began in the left side in the transverse sinus, and extended finally through the torcular and involved the right transverse, inferior petrosal, and cavernous sinuses, and the upper part of the right jugular vein. In this same case there was found during an exploration of the cerebellum for a supposed abscess an encapsulated collection of serous fluid, the nature of which was not explained, neither at the operation nor at the autopsy.

The second case, a boy, aged four years, is remarkable for the rapidity with which thrombophlebitis developed after an acute otitis media. Symptoms of pneumonic metastasis set in on the fourth day of the otitis. [This is another instance in which the ear disease in a child caused the pneumonia.] In this case, as the drum cavity and the antrum showed very little change, the author supposes that in this child there occurred a metastasis by a leap and not by contiguity, such leaping method of formation of a suppuration far from the primary seat in the ear being not uncommon in otopathology.

In the third case, a boy, aged nine years, with foul chronic purulent otorrhœa, typical symptoms of pyæmia and endocarditis occurred, with remarkable variations in temperature, viz.: from 96° F. to 106° F., followed, however, by entire recovery of health. The bony cochlea was thrown off as a sequestrum in this case, six months after the first pyæmic symptoms; the aural discharge then ceased. The tuning-fork could be heard by bone conduction in the ear without a cochlea.

DISEASES OF THE LARYNX AND CONTIGUOUS STRUCTURES.

UNDER THE CHARGE OF

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Historic Records.—The studious DR. C. CHAUVEAU, of Paris, has just presented to his colleagues the first volume of a history of diseases of the pharynx, comprising the Greco-Roman and Byzantine and Arabic periods.

He begins with the fifteenth century, and presents abstracts and comments of the various authors, both on diseases and on remedies, in a few instances presenting the Latin text instead of a French translation. The Arabic section is represented by old translations in Latin.

The Relation Existing Between Diseases of the Conjunctiva, Nose, and Throat.—PROF. HEMAN H. BROWN, of Chicago, discusses this subject (*Journal of the American Medical Association*, June 15, 1901), showing that nervous, arterial, venous, and lymphatic connections are to be duly appreciated as well as the direct connection through the nasal duct.

Nasal Lesions after Middle Age.—DR. GEORGE COATES (*London Lancet*, April 20, 1901), in a paper "On the Causation and Treatment of Profuse Epistaxis in People Beyond Middle Age," narrates five cases, three of them in women. None was traumatic, and several of them developed mitral or aortic regurgitation. In all of these cases the sequence of events which led up to the epistaxis was essentially the same, namely, long-continued high arterial pressure, with some cardiac failure from an over-filling of the venous system, and, finally, leakage from an over-distended vein.

DR. BEAMAN DOUGLASS (*New York Medical Journal*, May 25, 1901) read a paper on "The Nasal Condition Observed in the Aged," before the Section of Laryngology of the New York Academy of Medicine, in which he finds that the lesions in elderly people do not present anything like the distress they do in younger persons, and he suggests some theoretical considerations in possible explanation.

Primary Chancre of the Septum of the Nose.—DR. W. FREUDENTHAL, of New York, narrates a case (*New York Medical Journal*, May 11, 1901), at first mistaken for influenza, in the person of a physician who had conveyed the virus by picking his nose after a vaginal examination of a syphilitic subject. A summary of the literature on syphilis of the nose accompanies the article.

Saddle Nose.—Under a combined intranasal and extranasal operation for the correction of a congenital concave vertical and lateral deformity of the nose, DR. BURTON S. BOOTH, of Troy, N. Y., describes (*New York Medical Journal*, April 27, 1901) his procedure as successfully practised upon a young lady, aged eighteen years, who, with a lateral deformity from deviation of the septum, had a saddle nose deformity due to spreading and non-development of the nasal bones, with a like condition to some extent of the ethmoidal and sphenoidal bones. The procedure is very ingenious, but cannot be well condensed for these columns, and the interested reader is, therefore, referred to the original.

Malignant Intranasal Growth.—DR. BROECKAERT, of Gand, reports (*Revue Hebd. de Laryngologie, d'Otologie et de Rhinologie*, June 15, 1901) a case of polyp of the mucous membrane which underwent transformation into a lymphangiosarcoma or intralymphatic endothelioma. The case occurred in a man, aged sixty-two years, and is illustrated by engravings of microscopic appearances.

The tumor was removed by external access with the cold wire snare, curette, and forceps; and on the next day serious erysipelas of the face developed, and the patient died in two days.

A bibliography of twenty-seven additional cases follows.

Nasal Hydrorrhœa.—DR. AUGIÉRAS, of Laval, reports (*Revue Hebd. de Laryngologie, d'Otologie et de Rhinologie*, June 29, 1901) a case of nasal hydrorrhœa of parotid origin following an operation for empyema of the maxillary sinuses. A salivary fistula had been left after operation which discharged into the sinus. Upon thorough cauterization of its borders the rhinorrhœa ceased.

Syphilitic Hydrorrhœa of the Maxillary Sinus.—DR. AUGIÉRAS reports (*Revue Hebd. de Laryngologie, d'Otologie et de Rhinologie*, June 29, 1901) a case in a woman, aged twenty-three years, with stigmata of hereditary syphilis. The hydrorrhœa of the maxillary sinus became developed at the same time that the bone suffered an access of syphilitic osteoperiostitis, and it subsided with the relief of the osseous lesion under antisyphilitic treatment.

Case of Sphenoidal Sinusitis.—PROF. H. GAUDIER reports (*Revue Hebd. de Laryngologie, d'Otologie et de Rhinologie*, June 15, 1901) a case which occurred in a man, aged forty-one years. The sole symptom was headache. The diagnosis was suggested by pain produced by contact of the probe with the anterior nasal face of the sphenoidal sinus. The frontal and maxillary sinuses and the anterior and posterior ethmoidal cells were healthy. The case was cured by operative procedure, including preliminary removal of a spur of the septum and a hypertrophied inferior turbinate and the entire posterior portion of the middle turbinate, in order to gain access to the orifice of the sinus. This was dilated by rotating the canulated sound; the anterior wall of the sinus was then removed with the curette, which brought away considerable pus at each stroke. Relief was prompt, and the aperture made with the curette gradually diminished in size.

Cardiac Stricture of the Œsophagus Relieved by Dilatation from Below after Gastrostomy.—DR. H. ALAPY (*Archiv für klin. Chirurgie*, 1901, No. 4) reports a case of a child, aged seven years, with two strictures, the result of swallowing lye. The lower stricture, just above the cardia, could not be penetrated even with a filiform bougie. Gastrostomy was performed, and a week later an elastic bougie was introduced through the stomach up to the stricture. A silk catheter was then passed over it and the bougie withdrawn, after which a filiform bougie was passed through the stricture and out by the mouth. Dilatation was readily accomplished, and the child recovered.

Œsophagotomy.—MM. PIERRE SEBILEAU and E. LOMBARD report (*Annales des Mal. de l'Oreille, du Larynx*, etc., January, 1901) a successful external œsophagotomy upon an infant, aged three years, who had swallowed a sou piece twenty-four hours before the operation. The presence and position of the foreign body had been determined by radiography.

Parotitis.—An additional case of parotitis in pneumonia has been reported by DR. GEORGE WILLIAM NORRIS (*Philadelphia Medical Journal*, April 27, 1901) in a man, aged fifty-eight years, just recovering from a right-sided croupous pneumonia. The parotitis was on the left side, and incision became necessary on account of suppuration.

There is a bibliographic record of seventeen other cases, most of them reported in the same journal.

PATHOLOGY AND BACTERIOLOGY.

UNDER THE CHARGE OF

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The Question of Experimental Granulomata.—KONSTANTINOWITSCH (*Virchow's Archiv*, 1901, vol. clxiii. p. 120) was induced on account of De Meser's case (cf. *supra*) to try the effect of injecting lycopodium spores into animals. He inoculated rabbits. In one case an abscess was produced. In another animal two firm nodules were formed, which reached the size of a hazel-nut after twelve days. One nodule was excised and examined after eighteen days; the other after forty-five days, when it had begun to diminish in size.

The first nodule was composed of proliferated connective tissue and endothelial cells, with numerous giant-cells. Lycopodium spores were present in large numbers, often in the protoplasm of giant-cells. The nodule itself was a granuloma due to the reaction produced by a foreign body.

The second nodule showed the same structure as the first, except that the granulation tissue was denser and more fibrillated.

R. Martin has injected lycopodium spores into the veins of animals, and found in the lungs small nodules composed of "embryonal cells"—*i. e.*, granulomata.

Numerous observers have injected blastomycetes into animals and produced granulomata. Hence one must be very cautious about accepting the conclusions of men who claim that blastomycetes are the cause of cancer.—E. H. N.

The Parasitic Theory of Cancer.—BORREL (*Annales de l'Institut Pasteur*, 1901, vol. xv. p. 49) gives an excellent brief review of the literature on the theory of the parasitic origin of cancer. He divides the work into three stages: 1. "Parasites" described by Neisser, Darier, and others, and believes that their "parasites" were epithelial cells undergoing special changes. 2. "Parasites" of the type described by Thoma, Sawtchenko, and others. These are intracellular bodies, round, single, or multiple, occurring chiefly within carcinomatous epithelium of glandular type. These bodies show a superficial resemblence to certain stages in the development of coccidia. Borrel believes that these bodies arise from peculiar changes which occur in the attractive sphere and centrosome of carcinoma cells. 3. "Parasites" believed by some men to be blastomycetes. Borrel says that the men who believe in this theory have assumed that all sorts of cell inclusions with a circular outline are blastomycetes, while in fact the inclusions have no morphological likeness to blastomycetes, and the infinite variety of cell inclusions even in carcinoma cannot all arise in the same way. The objections to the blastomycetic theory are: the nodules produced in animals by inoculation with blastomycetes are, with the exception of two cases of

Sanfelice (cf. *infra*), of mesoblastic type; most men, with decent asepsis in making cultures, do not obtain cultures of blastomycetes from carcinomata, and there is no evidence that yeasts are found within epithelial cells. Borrel analyzes Sanfelice's two "successful" cases, and decides that there is no evidence that the tumors were due to the action of blastomycetes.

Borrel's own contribution is a demonstration of the fact that bodies morphologically identical with the "parasites" of cancer are produced in normal and carcinomatous cells by certain peculiar changes in the attractive sphere and centrosome. He employs special technique in hardening and staining tissues. In the testicle of guinea-pigs the attractive sphere and the centrosomes of cells which are to become spermatozoa show stages of development in which they resemble the "parasites" seen in cancer cells. In the cells of carcinoma the attractive sphere with included centrosomes may give rise to exactly similar appearances. At times there comes a collection of portions of the sphere about each of several centrosomes, producing appearances like those seen in the "spore cyst" of various believers in the parasitic theory.

Hence, Borrel concludes that the so-called "parasites" are due to peculiar changes of the attractive sphere about the centrosome. He says that the theory of a parasitic cause is attractive, but that at present there is no evidence to support any of the theories.

Borrel's article is an excellent *résumé* of the status of the parasitic theory. His own work is very conclusive. The reviewer has seen his specimens, and can vouch for the accuracy of the plates.

[The three preceding articles are valuable additions to the literature that is accumulating to show that at present there is not the slightest evidence to prove that the peculiar bodies seen in epithelial cells of carcinomata are "parasites" of any sort—bacterial, coccidial, or blastomycetic. We are no nearer a demonstration of the cause of epithelial malignant tumors than before, and, if a parasitic cause ever is demonstrated, it will be along lines different from those pursued during the past ten years.]—E. H. N.

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OCTOBER, 1901.

ON THE CLINICAL ASPECTS OF PLAGUE.[1]

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As the time allotted to this discussion is necessarily limited to a few minutes, I shall confine my remarks chiefly to the characterization of the clinical types of plague and to the diagnosis of the disease rather than enter upon an analysis of the individual symptoms. The statements are based upon a clinical study of plague made in San Francisco[2] in February, 1901, and previously in 1899, in Hong Kong and in India (Bombay, Poona). The descriptions are based upon the conception that plague is a disease due to infection with a bacillus (B. pestis), which is capable of causing acute general septicæmia without visible local reaction in highly susceptible animals, or a local process (usually manifested in the nearest lymph glands rather than at the site of inoculation) in resistant animals, or processes intermediate in severity in animals intermediate in resistance.

The first case of plague was discovered in San Francisco on March 6, 1900, by Drs. F. P. Wilson and W. H. Kellogg, the diagnosis being confirmed by animal experiment by Dr. J. J. Kinyoun, of the United States Marine Hospital Service. There are indications that the disease has existed even longer, but the proof for this can scarcely be brought. In all probability it came to San Francisco from Hong Kong or Canton, and is accordingly to be looked upon as an offshoot of the Chinese epidemic. The disease in San Francisco has at no time prevailed in the form of an outspoken epidemic, the mortality tables not being conspicuously altered by its presence:

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[1] Based on remarks made before the Association of American Physicians, Washington, May 1, 1901.

[2] As a member of a Commission appointed by the Secretary of the Treasury under the orders of the Surgeon-General of the Marine Hospital Service.

MORTALITY FROM ALL CAUSES AMONG CHINESE OF SAN FRANCISCO, 1897–1901.

Months.	1897	1898	1899	1900	1901	Months.	1897	1898	1899	1900	1901
January,	37	35	46	64	45	August,	35	47	43	19	
February,	46	36	39	48		September,	45	27	35	27	
March,	38	46	37	47		October,	36	53	44	32	
April,	35	41	33	30		November,	39	66	37	34	
May,	27	34	36	42		December,	23	46	48	32	
June,	30	21	46	25							
July,	39	25	34	38		Total,	430	477	478	438	45

On the contrary, the progress of the disease in California has been that which has characterized plague before the outbreak of a great epidemic in nearly every place where the disease has prevailed. It is the same kind of "sneaking" progress as was seen in Hong Kong, Calcutta, and Bombay for months before large numbers of people were attacked. That such "sneaking" epidemics may die out without culminating in a large outbreak was demonstrated by the experience in Ahmedabad from October, 1896, to August, 1897, where, though one hundred and thirty-six cases of plague were imported, the disease developed in only twenty-seven of the inhabitants.

In connection with the fact that no great outbreak has occurred in San Francisco, it is significant that as far as ascertained there has been no general infection of the rats of that city. A small number of rats found dead, as well as several living rats caught in the sewers of Chinatown, showed no evidence of infection with bacillus pestis.

Up to the time of our visit to San Francisco twenty-five deaths due to plague had been discovered during a period of about eleven months (March, 1900, to January, 1901). These cases have been reported by Dr. Kellogg,[1] and it is from his reports that I have drawn the data referable to the cases which occurred before February, 1901. During the eight days—February 6 to February 13, 1901—the special commission from the Treasury Department found six cases of plague. Altogether, then, from March 6, 1900, to February 13, 1901, thirty-one cases of plague had been recognized. Most of them were found dead, and the diagnosis was based upon the pathological appearance and the bacteriological examination. Several cases were, however, studied during life. Of the six cases observed by the Commission, three were seen during life, and two of these three recognized clinically as cases of bubonic plague.

---

[1] Kellogg, W. H. The Plague: Report of Cases, Occid. Med. Times, S. F., 1900, vol. xiv. pp. 197–207. Kellogg and Kinyoun, J. J. The Plague: Thirteenth Case, ibid., 1900, vol. xiv. pp. 245–257. Kellogg, W. H Plague Cases Fourteen and Fifteen, ibid., 1900, vol. xiv. pp. 284–85. The Plague in San Francisco, Cases Sixteen, Seventeen, and Eighteen, ibid., 1900, vol. xiv. pp. 345–47. Plague in San Francisco, ibid., 1901, vol. xv. pp. 11–15. Plague Cases Twenty-three, Twenty-four, and Twenty-five, ibid., 1901, vol. xv. pp. 45–46.

No.	Name.	Age.	Sex.	Color.	Place of death.	Date of death.
1	Wing Chut King,	41	M.	Mongolian,	1001 Dupont,	Mar. 6, 1900
2	Chu Gan,	22	M.	"	723 Sacramento,	" 15, "
3	Ng Ach Gin,	37	M.	"	905 Dupont,	" 17, "
4	Lee Sun King,	47	M.	"	Oneida Place,	" 18, "
5	Law An,	38	M.	"	St. Louis Alley,	Apr. 24, "
6	Lim Fa Muey,	16	F.	"	739 Clay,	May 11, "
7	Chu Sam,	38	M.	"	717 Jackson,	" 11, "
8	Chin Moon,	16	F.	"	730½ Commercial,	" 13, "
9	Her Woon Jock,	53	.M.	"	740 Pacific,	" 14, "
10	Dang Hong,	40	M.	"	706 "	" 29, "
11	Chen Kney Kim,	49	M.	"	819 Clay,	June 2, "
12	Jay Man Tong,	60	M.	"	759 "	" 9, "
13	Lee Wing Tong,	40	M.	"	767 "	July 6, "
14	William Murphy,	34	M.	White,	427 Dupont,	Aug. 11, "
15	Ham Tan,	29	M.	Mongolian,	900 "	" 15, "
16	Lee Do Hen,	50	M.	"	710½ "	Oct. 5, "
17	Chun Yen,	37	M.	"	767 Clay,	" 10, "
18	Taik Dong Leong,	39	M.	"	705 "	" 14, "
19	Young Moon Li Chee,	30	F.	"	802 Dupont,	" 31, "
20	Young Wah Noui,	9	F.	"	802 "	Nov. 1, "
21	Anne Roede,	28	F.	White,	Pacific Hospital.	" 3, "
22	Lee Ho,	30	M.	Mongolian,	844 Washington,	Dec. 7, "
23	Chun Wey Lung,	60	M.	"	780 Jackson,	Jan. 6, 1901
24	Leam Wing Low,	59	M.	"	633½ Clay,	" 15, "
25	Angela Colombo,	...	M.	White,	5 Lafayette Place,	" 15, "
26	Chun Ah Chou, *a*	44	M.	Mongolian,	814 Washington,	Feb. 5, "
27	Lum Hong Yuen, *a*	37	M.	"	28 Ross Alley,	" 6, "
28	Wong Chi Lui, *a*	50	M.	"	15½ Waverley,	" 7, "
29	Tom Shom, *a*	51	M.	"	814 Washington,	" 10, "
30	Ungh Ah Buck, *a*	45	M.	"	St. Louis Alley,	" 11, "
31	Foong Ah Fong, *a*	12	F.	"	747 Sacramento,	" 12, "

a Observed by Commission.

NOTE.—Particular places of death of following numbers were as indicated below: No. 8, Pacific Hospital, Stockton and Chestnut Streets; No. 13, City and County Hospital; No. 14, City and County Hospital; No. 21, Children's Hospital, 3700 California Street; No. 25, City and County Hospital.

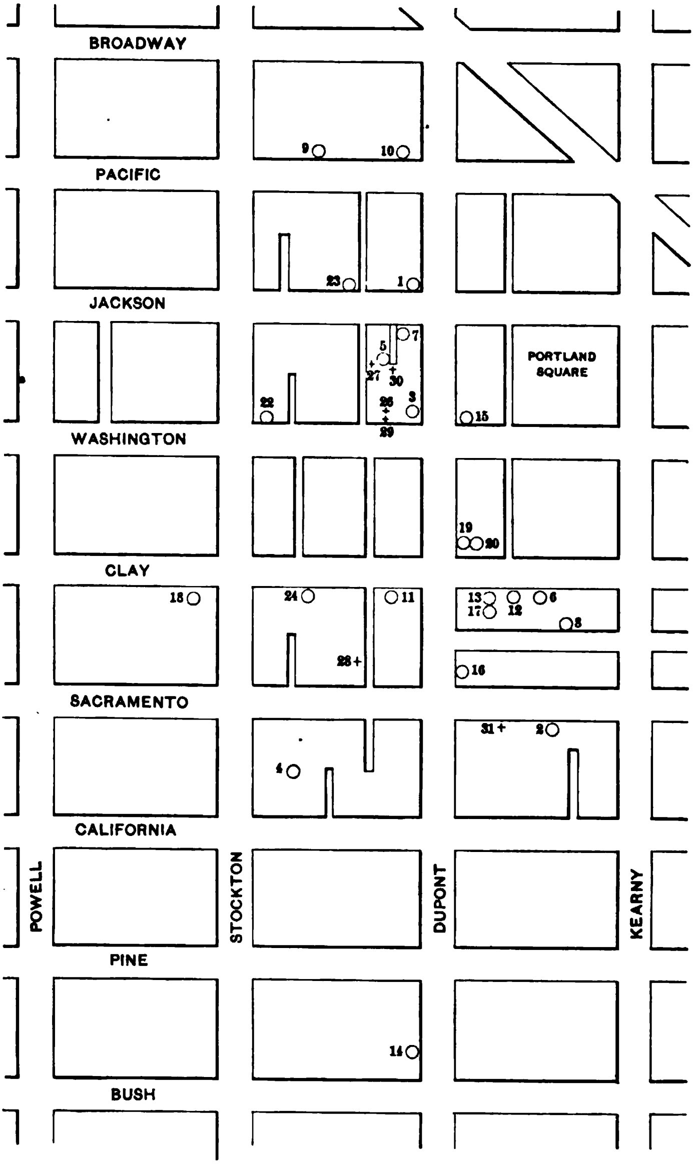
The accompanying map (page 380) shows the distribution of the plague cases in San Francisco:

Of the thirty-one cases, twenty-eight were Mongolians and only three Caucasians. As to age, the following table gives the deaths according to decades:

Age.	Deaths.
1 to 10 years	1
11 " 20 "	3
21 " 30 "	5
31 " 40 "	9
41 " 50 "	7
51 " 60 "	5
61 " 70 "	0

As is well known, plague usually kills more people between twenty and thirty than in any other decade. It is to be remembered, however, that in San Francisco the Mongolian population may scarcely be regarded as a normal one. The number of females is small, there are relatively few births in Chinatown, and relatively few young people.

The predominance of males and middle-aged individuals is easily explicable when the legal status of the Chinese in America is considered.



Map of "Chinatown," San Francisco.

Circles indicate cases seen and regarded as plague by City Board of Health before arrival of Commission.

Crosses indicate cases of plague observed by the Commissioners from February 5th to February 12, 1901.

Of the thirty-one cases, six were in females and twenty-five in males. Experience in other epidemics indicates that there is but little difference in the number of males and females attacked. The disproportion in the San Francisco epidemic is doubtless dependent upon the small number of female Chinese living in Chinatown.

The type of the disease which has been prevailing is the bubonic. In twenty-three of the thirty-one cases a definite bubo (probably primary) was made out in twenty-three instances. Only one primary septicæmic case was established, and only one pneumonic case was observed. In seven of the cases the descriptions do not permit of definite classification as regards the clinical type, though the diagnosis of the disease itself was in each case fully established.

The daily inspections of the sick and dead permitted of observations relative to the mode of life of the people in the fourteen blocks of San Francisco which make up "Chinatown." These observations were extended by special trips of inspection under the guidance of officers of the city detective force and by numerous independent trips of inspection.

The dwellings of the poorer classes of Chinese were found to be here, as they seem to be everywhere, shockingly unsanitary. In places there is marked overcrowding; the rooms are small; they are often entirely devoid of light or means of ventilation, and nearly always insufficiently lighted and ventilated; many of them are filthy; some of them, especially those situated in basements, are damp, and emit a foul stench. These faults in sanitation are not confined to the tenement-houses of the Chinese; on the contrary, in the rear of or over or under some of the more pretentious business buildings are to be found sleeping and living apartments which are most objectionable from a sanitary point of view.

The Chinese in San Francisco are, however, in many respects much better off than are their countrymen in great native centres like Canton, or even than those in a city like Hong Kong. There is almost an entire absence of the utter destitution met with among many of the Chinese in Asia. The Chinese in San Francisco are, on the whole, very well fed, for wages are high and food is abundant and cheap. They are also well clothed, as a rule, and particular emphasis is to be laid upon the fact that the Chinese here wear shoes, stockings, and trousers, since it is believed by many that the bare legs and feet of the Chinese in Hong Kong and Canton had much to do with the frequency of infection with plague in those places.

A large percentage of the Chinese in San Francisco, it is said, smoke opium. There are a number of Chinese prostitutes, but inspection of the quarters occupied by the latter would indicate that the rooms in which they live are, on the whole, more wholesome as regards air-space, light, ventilation, and cleanliness than those of the other inhabitants of the district.

The Bubonic Cases or Glandular Plague.

The ordinary clinical features of this form are now so familiar that they need scarcely be entered into in detail. The symptom-complex is characteristic, and there ought to be but little difficulty, as a rule, in making a diagnosis. The sudden onset of fever, preceded, usually, by but few prodromata, associated very quickly with painful glandular enlargements, severe headache, nausea, and vomiting are the conditions commonly met with. The fever varies between 103° and 105° F., but may rise as high as 108° or even higher. There is a moderate leucocytosis associated with sòme anæmia, and with a moderate diminution in the amount of hæmoglobin.

The buboes usually appear rapidly after the first onset of symptoms. Indeed, if a physician is called he nearly always finds a bubo already developed. The size varies according to the stage of development of the bubo and the character of the infection. Usually one gland of a group swells first, after which there is rapid extension to other glands of the packet. The larger buboes are due to swelling of several glands and œdema of the adjacent tissues. In the fully developed buboes it is usually impossible to make out the individual glands of which the whole swelling is made up. The buboes are exquisitely painful, as a rule, though some lethargic patients complain but little. They are especially sensitive on pressure. Among the Chinese it was common to find a black plaster applied to the region of the swollen glands, to alleviate what the patient regarded as "rheumatic" pain. A good deal of stress is to be laid upon the elastic resistance of the swelling, which is due to the œdema. The skin may be tense over the swelling; it looks thin and glossy. It is often reddened over the bubo, and occasionally vesicles or pustules appear on the surface. In very large buboes, especially in the cervical region, the jelly-like trembling which has been described can easily be made out. If the œdema becomes very extensive the bubo may be obscured. Most patients assume the attitude best calculated to relieve the tension in the region of the bubo; thus, where the bubo is inguinal the leg is flexed at the knee and the thigh moderately flexed and rotated outward.

As Müller and Pöch have pointed out, the clinical classification of buboes differs of necessity somewhat from the classification based upon the pathology of the disease.[1] The pathologists distinguish primary buboes of the first order, primary buboes of the second order, and secondary buboes, the first group including the buboes appearing in the glands nearest the site of inoculation, the second group including the buboes formed by extension of the bacilli directly through the lymphatics from the primary bubo to a second adjacent group of lymph glands, and the third group including buboes arising through the deposition of bacilli from the circulating blood in lymph glands in any part of the body. Clinically, it may be very difficult or impossible to distinguish primary buboes of the second order from secondary buboes. We are reduced to distinguishing the "clinically primary" bubo from the "symptomatic" bubo. The clinically primary bubo is nearly always a primary bubo of the first order. The symptomatic buboes may be primary buboes of the second order or true secondary buboes.

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[1] See Dr. Flexner's report.

In a suspected case of plague it is necessary to search widely for a primary bubo. If it is not easily found, one should examine every part of the body in which lymph glands are situated before concluding that no primary bubo is present. It is probable that there are some primary buboes too small to be recognized clinically, though it is more likely that in many instances the smaller buboes which could have been detected by careful search have been overlooked. In the bubonic form death occurs usually in from four to six days. In San Francisco we got histories of a much longer duration in several cases. Where the disease is prolonged suppuration may occur. A striking feature of the disease is the absence of lymphangitis between the site of inoculation and the lymph gland attacked. It is rare that one can make out the point of entrance of the virus, though occasionally a vesicle or a pustule exists, the so-called primary skin lesion in the bubonic form of the disease.

The inguinal type of glandular plague was much more common in San Francisco than the axillary and cervical types, and this is in accord with general experience. As an example of typical inguinal bubonic plague, the following instance may be cited:

Tom Shom, male, aged fifty-one years, actor in Chinese theatre; room above theatre at 814 Washington Street, near room of late Chun Ah Chou (see death 26). This man was reported as ill to the Six Companies, and was examined clinically on Friday, February 8th, by the writer, who obtained the following history: The man had been acting in the theatre about two weeks before, although it had been stated that he had not been very well for from six to seven months previously. On February 4th he became seriously ill with fever and delirium. There had been some vomiting. The urine, as observed by the attendant, was described as brandy colored. He had a Chinese doctor in attendance, and his friends had not considered him ill enough to make a report to the Six Companies worth while. The man smoked about fifty cents' worth of opium daily. On clinical examination the patient was found lying upon his back in bed, with legs drawn up; he was in a state of semi-stupor. His pulse was 108, quick, rather full, but of low tension. The skin was hot and dry; respiration 20 to the minute.

The face had an anxious expression; the tongue was coated in the middle. There was no palpable enlargement of the glands of the neck or axillæ, but in the right groin several slightly enlarged glands could be distinctly felt, and the patient, though his mind was partially clouded, winced decidedly when either groin was palpated. It was evident that the glands were quite tender. In the absence of urethral discharge, chancre, or evidence of local irritation in the lower extremities, the case was, on account of the local and general phenomena, regarded as one of plague. The skin was cleansed and a sterilized hypodermic needle introduced into the groin. A few drops of bloody fluid were withdrawn, presumably from one of the enlarged glands. It was difficult to be sure of this, however, as the patient could not be kept quiet while the needle was being inserted. No colonies of plague bacilli developed in the inoculated tube. The necropsy, subsequently made, indicated that the needle had failed to enter an enlarged gland.

The patient was seen on the following day, when his condition showed no change for the better. The pulse was 136 and feebler, the patient seemed in general weaker, and an unfavorable prognosis was made. The patient's friends were told that an injection of Yersin's serum offered the best chances for recovery, though they were also told that not much could be hoped from any treatment in the stage of the disease in which the patient then was. The offer was refused. The man died on February 10th, the next day.

The dead body was inspected on the morning of February 11th. The body was in a state of firm rigor mortis, the limbs being strongly flexed. On breaking down the rigor mortis and palpating the glands in the groin, it was difficult to say positively that there was any enlargement of the lymphatic glands In view of the enlargement distinctly made out during life and the clinical picture which had been observed, the death was believed to be one due to plague, and a pathological and bacteriological examination undertaken.

At autopsy there was a slight swelling in the right inguino-femoral region, which, on incision, revealed slightly œdematous subcutaneous tissue, with slight enlargement of the glands. The largest gland was the size of a filbert, and its surface was dark and hemorrhagic; on section, it presented distinct hemorrhages; other glands were swollen, soft, juicy, and hemorrhagic. The spleen was enlarged, soft, and friable. The examination of the groin showed that the hypodermic puncture made for the withdrawal of fluid for diagnostic purposes during life had failed to enter a lymph gland.

Cover-slips from the spleen and glands showed large numbers of bacilli having the characteristic properties of the B. pestis.

Sometimes these inguinal cases are associated with a marked hemorrhagic diathesis. This existed in the case of W. M.,[1] who died on August 11, 1900.

M. was a white man, aged thirty-four years, who on August 7, 1901, complained of pain and slight swelling of the right groin, followed by nausea, general soreness, headache, and vomiting. He had albumin in urine, his temperature was 100°, pulse 100, and the bubo in the right femoral region became rather painful. Died on August 11th. Autopsy by Prof. Taylor. Two enlarged lymph glands were found in the right groin. These were hemorrhagic, but not purulent. The femoral glands were also enlarged. The plague bacillus was present in smears made from the glands, and animals inoculated therefrom died with typical plague lesions. The mesentery was mottled with hemorrhages. The walls of the stomach were markedly injected, and there were submucous hemorrhages in this organ. The spleen was very friable. Extensive hemorrhages were found about the pancreas, in its substance, and in the lesser peritoneal cavity. There was no fat necrosis.

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[1] See Dr. Kellogg's report.

Axillary buboes were not met with during the stay of the commission in San Francisco, nor do they appear to have been seen by San Francisco clinicians. In view of the experience in India and China, where axillary buboes are much more common than cervical buboes, it would seem possible that the axillary buboes, possibly of small size, had been overlooked in some cases in San Francisco. Axillary buboes are, however, more common in women than in men, and the small number of women in San Francisco may have had something to do with the non-discovery of axillary buboes.

Cervical buboes come next in frequency. They are usually very large and painful. The œdema is extensive, and there is often difficulty in swallowing. A typical case was seen by the Commission on February 12th:

Ung Ah Buck, aged forty-five years, found dead at Wing Hai's undertaking establishment, on Sacramento Street. This man had been seen alive and examined by the writer on the previous day, who diagnosed the case, *intra vitam*, as one of cervical bubonic plague. When seen alive he was in a room upstairs in the rear of 921½ Dupont Street, opposite St. Louis alley. The man was sitting up, but looked extremely ill. His face was pale, cyanotic, and anxious-looking. His voice was very feeble, but his intelligence seemed almost unclouded, and he was able to carry on a conversation, though with difficulty, with the interpreter. The friends stated that he had at times wandered in his talk. He was under the care of Dr. Mather. The patient stated that he had been ill for two weeks. His neck had been swollen for one week, and he regarded the condition as quinsy. With the aid of a tongue depressor the throat was examined. The fauces were swollen and reddened, the swelling being very marked in the left side. The left palatine tonsil was much enlarged and showed on its surface a grayish-white patch the size of a dime. The reddening in the throat was general, and there was less local injection than one ordinarily sees in diphtheria. The left side of the neck was brownish-yellow, having been painted over with a solution of iodine. On inspection and palpation marked bulging was found. This seemed to be due to enlargement of the cervical lymphatic glands. The case was diagnosed as one of plague, with cervical bubo. The man died the next day, and a complete autopsy was made by Dr. Flexner. The pathological examination showed typical lesions of plague, and the bacteriological examination made by Dr. Novy demonstrated the presence of B. pestis.

Autopsy, February 12th at noon, at the undertaking shop of Wing Hai, by Dr. Flexner, Drs. Novy, Barker, Kellogg, and Wilson being present. The left side of the face and neck presented a marked diffuse swelling, extending from the angle of the jaw backward to the sterno-cleidomastoid muscle and below, almost reaching the clavicle.

On incising this region the parotid gland was first reached; this organ presented a normal appearance. After dissecting away the parotid gland a group of greatly enlarged deep glands surrounding the carotid artery and jugular vein came into view. The periglandular tissue was infiltrated with bloody fluid and presented a sodden appearance. The enlarged glands and portions of the surrounding tissue were excised; the former were found to be swollen (several reaching the size of an English walnut) and to be wholly altered in appearance and consistence. In color they were deep purplish, and on incision a hemorrhagic fluid exuded. Opaque points of necrosis were also present.

The general subcutaneous fat was well developed; there was no general œdema. Peritoneum appeared smooth and glistening; there was no excess of fluid in abdominal cavity, and the abdominal glands were not noticeably swollen. The spleen was enlarged to fully twice its normal size; it presented a purplish color, and its consistence was diminished. The pleural cavities were dry. The lungs retracted moderately upon removal of the sternum. The lower lobes of the lungs were congested, but no consolidation was made out. No other abnormality was observed in the body.

The organs and tissues removed at this necropsy, consisting of the enlarged cervical glands and spleen, were taken to the laboratory, where cover-slips, cultures, and animal inoculations were made.

The cover-slips from the spleen showed large numbers of a bacillus having the morphology and staining properties of the B. pestis. The cover-slips from the glands differed in their appearance. In some instances there were present large numbers of bacilli similar to those in the spleen, together with a few diplococci or short chains of cocci. Other cover-slips showed, beside the organisms mentioned, a bacillus having the morphology of the B. diphtheriæ. Animals inoculated died with typical plague lesions, and pure cultures of the B. pestis were obtained from them.

Cubital and popliteal buboes were not met with in San Francisco.

Symptomatic buboes were seen in several cases. On autopsy these proved to be in some instances primary buboes of the second order, in other instances true secondary buboes.

The Septicæmic Cases.

The more one studies plague the more he is impressed with the resemblance of plague infections to those which occur in anthrax. It has been doubted by some, among them no less acute an observer than Müller, whether primary plague septicæmia occurs without any primary bubo. It is easy to say when no primary bubo is found in a case of plague septicæmia that the pathologist has overlooked the primary bubo at autopsy, but autopsies have been made by very careful pathologists in which no definite primary bubo could be made out. And it would seem that we are as much justified in assuming the existence of a primary plague septicæmia as of any other form of primary septicæmia. Terminal plague septicæmia in fatal cases of the bubonic form, and probably of other local forms of disease, is far more common. Between a plague septicæmia, primary from the first, and the terminal plague septicæmia secondary to primarily localized plague infections, various transition forms are met with.

PRIMARY PLAGUE SEPTICÆMIA. One can think of the bacillus getting into the blood in cases of primary plague septicæmia in various ways. When a human being or an animal is extremely susceptible it is conceivable that the bacillus could enter through the skin and pass through the lymph glands, and so into the blood without setting up a primary bubo. In the same way it could enter through the conjunctiva or other exposed mucous membranes. It is possible that entrance could occur from the respiratory tract without setting up local pulmonary lesions other than a mild bronchial catarrh, and, finally, direct infection of the blood through the bites of insects may be thought of.

In primary plague septicæmia the clinician has to deal with the phenomena of general septic infection; the fever is high, the pulse is frequent and feeble; there may be delirium and coma. A splenic tumor rapidly develops, and is often associated with acute pain in the left side. There is tenderness over all the lymph glands of the body. Frequently there are hemorrhages into the skin or from the mucous membranes of the lungs, stomach, intestines, or urinary passages. In such cases the bacilli can frequently be found in cover-slips made from the blood; cultures from the blood are, however, more reliable for the discovery of the bacilli, and animals inoculated with a few cubic centimetres of blood die with typical lesions of plague. These primary septicæmic cases include many of the frightfully acute infections met with in large epidemics; death may occur in from one to three days from the time the patient is first attacked or even after the lapse of a few hours.

In San Francisco a white nurse died of what appears to have been this form of the disease. She was taken suddenly ill, complaining of severe pain all over the body. Her temperature was 40° C., pulse 104, respiration 33. There were hemorrhages from the urinary passages and the sputum was bloodstained. Hemorrhagic petechiæ were found about the elbows and ankles. She died in the hospital, and an autopsy was made by Dr. Harold Bruhn. The inguinal glands were slightly but not markedly enlarged. The axillary and cervical glands were not large. There was some free blood in the pelvic peritoneal cavity. In the mesentery the glands were slightly enlarged. No pulmonary lesions were found. The spleen was enlarged and softened. There were subperitoneal hemorrhages, and submucous hemorrhages in the intestine. The pathological diagnosis was septicæmia, with tendency toward minute hemorrhages in the tissue. Bacteriological examination proved that the blood was full of bacilli of plague, and there were enormous numbers of the plague bacilli in the spleen.

SECONDARY PLAGUE SEPTICÆMIA. It seems likely that in nearly all cases of bubonic plague at least a few bacteria get over into the blood. It is these which account for the true secondary buboes which are regarded by the pathologists as being embolic in origin. In many of the fatal cases of bubonic plague the bacteria go over into the blood and multiply in great numbers, so that the blood and spleen at death and shortly before contain large numbers of the plague bacilli. In cases of the bubonic form of the disease which recover it may be that such a general bacteræmia does not occur, the process remaining essentially localized to the primary buboes, or, if a few bacilli get over into the blood, they are filtered out by the organs, and give rise to either secondary buboes or to no noticeable phenomena.

Plague Pneumonia.

Primary plague pneumonia is to be distinguished from the secondary pneumonias which occur in the course of other forms of infection with plague. By primary plague pneumonia is understood that form in which the bacillus gains entrance to the body through the respiratory tract, and sets up a definite primary pneumonia, usually lobular, but sometimes pseudolobar in form.

Under the term secondary plague pneumonia are to be included:

(*a*) Pneumonia due to embolic infection of the lungs with plague bacilli in cases of bubonic plague or plague septicæmia.

(*b*) Ordinary bronchopneumonias complicating plague as they do other grave infections—*e. g.*, aspiration pneumonia and the like. The bronchopneumonias of this group are most often due to infection with the streptococcus or the micrococcus lanceolatus. Occasionally an aspiration pneumonia complicating plague is due to the plague bacillus itself. This is particularly apt to occur if there be ulcerated tonsillar buboes.

The only case of primary plague pneumonia recorded in San Francisco occurred before the visit of the Commission. It is Case No. 20 of Dr. Kellogg's series, a Chinese child, aged nine years, who died on November 1, 1900, at 802 Dupont Street.

In some epidemics primary plague pneumonia is the prevailing form of the disease. This appears to have been the case in the Black Death which spread over Europe in the fourteenth century, and also in the Pali-pest in 1836. Plague pneumonia is undoubtedly frequently overlooked during the course of an epidemic.

It is to Childe, of Bombay, that we owe the establishment of primary plague pneumonia as a definite clinical and pathological entity. The patient is taken suddenly ill with a chill, stitch in the side, severe headache, and high fever. The clinical phenomena of a grave pneumonia develop. The respirations are increased from 50 to 80 per minute, and signs of consolidation appear. The pulse is frequent and soon becomes very feeble. An acute splenic tumor can be made out. There may be sensitiveness in the region of the various lymph glands of the body. The typical rusty sputum of ordinary croupous pneumonia is but seldom met with. Instead the sputum is actually bloody (hæmoptysis) and may be copious in amount. There is usually extreme dyspnœa and marked cyanosis.

Nearly all cases of plague pneumonia are fatal, death occurring usually in from one to five days. The duration of the disease may, however, be even longer. During the Black Death it does not appear to have averaged more than two days.

Cutaneous Plague.

Though its existence by some has been denied, it seems clear that *primary* infection of the skin with the plague bacillus is a recognizable form of the disease. The analogy with anthrax here again becomes evident. The cutaneous lesions take the form of vesicles, pustules, or carbuncles.

When the lesions of the skin are secondary they are usually situated over buboes, and the extension to the skin would seem to be directly by way of the lymphatics from the lymph glands. Embolic infections of the skin may be thought of, but from what we know of the cutaneous bloodvessels they are probably rare.

Primary infections of the skin are certainly very unusual, their absence and the absence of lymphangitis between the point of entrance of the bacilli and the first lymph glands to be infected being characteristic features in the majority of the cases of the disease. A judgment as to the primary or secondary nature of a furuncle or carbuncle has to be based upon the time of its appearance. If it is among the first signs to develop, it may be regarded as a primary lesion; if it appear sometime after the onset of the symptoms, it must be looked upon as of secondary occurrence.

Mild Plague or So-called Pestis Minor.

At the beginning and end of large epidemics it is common to find numbers of cases of plague which are so mild that they cause the patients but little inconvenience; probably in many instances mild cases pass unrecognized. The severity of cases in any given epidemic appears to conform to a curve. The mild cases in the beginning give place gradually to more and more severe infections until at the acme of the epidemic the most violent septicæmic and acutely fatal cases are met with. This stage is followed by a decline in severity until finally the epidemic dies out in a series of mild ambulatory cases. The great importance of these mild cases of plague for the spreading of the disease is obvious. Since the bacilli are given off through the urine and feces an ambulatory case may spread the germs of the disease far and wide. Occasionally an individual who presents what is apparently a mild form of the disease in its early stages may later become very ill. For example, in San Francisco during the visit of the commission one of the fatal cases observed was not considered very ill by his friends in the early part of his attack. Indeed, he walked about and took food with his companions for several days, and it was only shortly before his death that the grave nature of the malady was realized.

There is room for much bacteriological work upon the epidemics of so-called pestis minor. There have been epidemics described in which as many as two hundred cases of the disease have occurred without a death. One naturally asks the question with regard to such epidemics, Are we dealing here with true bubonic plague or with some other disease? Bacteriological examination can alone settle the diagnosis in such instances.

Epidemics of so-called "climatic buboes" have been described by various authors (Ruge, Godding, Skinner, Nagel). The exact nature of these climatic buboes is not clear. While some authorities (Cantlie) assume that the disease is an example of a mild, non-fatal infection with the bacillus pestis, there are others (Godding, Scheube) who are just as positive that the disease is essentially different from plague. Here, again, we are in urgent need of bacteriological study. It alone will settle this mooted question.

In San Francisco, among the physicians who have been in practice there for some time, great stress was laid upon the "glandular swellings" occurring among the Chinese. It was asserted by some of the most experienced physicians in that city that such glandular swellings had been occurring among the Asiatic inhabitants for no less than thirty years. These physicians were convinced that the cases which were proved by bacteriological examination to be plague were precisely the same as those of glandular swelling observed in earlier years. In the absence of pathological and bacteriological examination of cases of so-called "glandular swelling" of the earlier days, it must for the present remain undecided what the nature of those cases really was. Of one thing there can no longer be any doubt—the "glandular swellings" occurring among the Chinese in San Francisco in February, 1901, are instances of true infections with the bacillus of bubonic plague.

In all the infections resembling mild cases of plague the importance of bacteriological and pathological examination for the establishment of the diagnosis is clear. With the help of the naked eye, the microscopical appearance of the lymph glands affected, and of cover-slips, cultures, and animal experiments from the diseased glands, there can be no difficulty whatever nowadays in distinguishing true plague from any other affection.

The Diagnosis of Plague.

In the diagnosis of this disease one will naturally be influenced as to the methods he will pursue by the circumstances under which he is working. If he is to decide as to the nature of the first suspected case in a place where the disease has not hitherto been known to exist, he will be very much more cautious in coming to a conclusion than where he has to pass judgment upon a suspected case in a region in which plague cases are known to be daily occurring. For no conscientious physician will impose upon a community the restrictions as regards travel or the inconveniences and financial loss to commercial interests which the positive diagnosis of plague and the public announcement thereof in a large centre entails unless he is absolutely sure of his ground.

The desirability of coming quickly to an absolutely certain conclusion in a *first* suspected case cannot be too strongly emphasized. It is of the greatest importance if plague is breaking out in a community to establish this fact beyond any possibility of question. Owing to the slowness with which plague tends to spread after its first appearance in a place, it is comparatively easy to stamp it out in the bud or limit the spread to a small focus if the very first case be recognized and the proper measures for the prevention of its spread be undertaken. Then, too, it is only when the people of the community are convinced of the presence of a disease which is capable of giving rise to a grave form of epidemic that they will bestir themselves to employ the proper means for the prevention of its spread and for its utter extermination.

In San Francisco the disease was recognized in March, 1900, and its true nature fully established by competent pathologists and bacteriologists. Whether any or how many cases of plague occurred in San Francisco before this date must remain in doubt. The medical men of the city who had had a training in pathology and bacteriology, or who had learned to have confidence in the results of pathological and bacteriological work, with a few notable exceptions, concurred in the diagnosis and urged the public to take the appropriate measures for the control of the disease. Unfortunately the matter became a political issue. A certain number of medical men, among them several of prominence, denied the existence of plague, and this, together with the fact that the disease did not spread to any large extent, helped to encourage the public in thinking that the disease was not bubonic plague—a belief which was heartily in accord with their hopes.

A doubt arose in the public mind as to the possibility of making a certain diagnosis in a suspected case. The people were told that no "living case" had been observed, and that the diagnosis rested purely upon pathological and bacteriological examinations. They were further assured that such examinations were insufficient for the making of a diagnosis, and the statement was circulated that bacteriology is "as yet too young a science to interfere in any way with the commerce of a great city."

As a matter of fact, the modern trained physician who has had experience with the disease can make in a case of plague an absolutely positive diagnosis more easily probably than in most of the other infectious diseases. *The diagnosis can be established beyond the shadow of a doubt.* Naturally, when dealing with a first case the most experienced clinician would hesitate to pronounce upon the existence of such a dreaded disease in a community until he had forged a chain of evidence which could not admit of dispute. If he saw the case alive he would subject it to a very thorough clinical examination, would weigh the positive signs with all faithfulness, and would make every effort to exclude the existence of diseases which in any way resemble plague, before deciding that the case was one of pest. If there were buboes, after excluding other possible causes of their origin, he would bacteriologically examine the juices extracted from them by hypodermic syringe. If the patient died he would examine the glands with the naked eye and microscopically, and would make a complete bacteriological examination of these glands, including animal inoculations.

It is not necessary to have a "living case" before one in order to establish the existence of plague in a city. The pathological appearances in themselves are absolutely characteristic in the majority of cases, and the bacteriological examination alone will suffice, if it be positive, for a decision. Fortunate we are that bacteriology, though a young science, has placed in our hands the means of becoming sure whether or not we have among us a disease of such dreadful possibilities as bubonic plague!

It is important, if possible, that men who have had experience with the disease be called upon to give a decision in a suspected outbreak. Aside from the confidence which the public would repose in the diagnosis under such circumstances, it is undoubtedly true that actual first-hand knowledge of the disease, clinically, pathologically, and bacteriologically, goes far to make conclusion in a given case quick and easy. The German Government, recognizing this fact, has arranged for definite plague courses at certain of the bacteriological institutes, where men may be prepared for the special study of the disease. When a suspected case is reported from any source, plague experts with special plague bacteriological outfits are sent at once to the place, and their report is accepted as final and acted upon immediately.

A large part of the difficulty in San Francisco was due to the non-education of the public and of a portion of the profession with regard to plague matters. As knowledge of plague has increased so rapidly during the past two or three years, and has been so greatly modified during the same period, it is not strange that erroneous views have been and are still in most places prevalent. The idea appears to be very general that if plague once starts in a place it will spread rapidly in the form of a violent epidemic, leading within a very short time to hundreds or even thousands of deaths. Nothing could be further from the truth. It is rare that plague spreads rapidly after the appearance of the first case; it would appear to be only after the rats of the place have become infected that, as a rule, a large outbreak occurs.

The diagnosis in March was made by competent men connected with the City Board of Health and the Marine Hospital Service, and was backed up by the opinion of the professors of pathology and bacteriology in the two best medical schools of San Francisco and by several of the prominent clinicians. The people of the city and State ran a needless risk in not trusting more fully the conclusions arrived at by the scientific men in their midst.

As a matter of fact, nearly all epidemics of plague begin with cases of the bubonic or glandular form, and this is, fortunately, the form which is most easily diagnosed. If one meets with a number of cases with buboes, occurring in the absence of venereal infection, and associated with severe general symptoms, some of the cases terminating fatally, he may, especially if he be dealing with Asiatic peoples, be almost certain that he has to do with an outbreak of bubonic plague. One may now and then meet with a septic case without buboes, but, as far as is known, when septicæmic cases are occurring in a place there are always at the same time other cases with buboes.

In all doubtful cases, and especially where one is dealing with a *first* case, a thorough bacteriological examination should be made. This should include a study of the juice from a bubo, if one be present, the sputum, the blood, the splenic juice, the urine, material from skin lesions, and, should there still be doubt, the feces. Cover-slip preparations, cultures, and animal experiments are to be resorted to. It is Dr. Novy's province to deal with the bacteriological examinations in detail, and I shall, therefore, not enter into the methods here. It is to be remembered that a positive result is of greater significance for diagnosis than a negative one. If no bacilli are obtained from the juice of a suspected bubo one should not stop with the first trial, but should make repeated examinations until the case is clear. Where the disease is epidemic it is unnecessary, in the majority of instances, for diagnostic purposes to go beyond the cover-slip preparation of the juice of a bubo. If this is positive as regards the presence of the plague bacillus, one need go no further. He who is familiar with the clinical symptoms of plague and with the appearance of the plague bacillus under the microscope, will not require to make cultures or animal experiments if, in connection with suspicious clinical symptoms, he finds great numbers of the characteristic bacilli in his cover-slip preparations made from the juice of a bubo. If there be any difficulty as to the diagnosis, cultures, and especially inoculation of guinea-pigs, will remove all doubt.

The serum reaction in plague would seem to be of but little value for diagnosis except, possibly, to indicate that an individual has had plague at some time previously, for during the first week of the disease, according to Zabolotny, a positive agglutinating reaction is not obtainable. Since in the majority of fatal cases death occurs from the fourth to the sixth day, the uselessness of the reaction for diagnostic purposes is obvious.

Plague may be confused in certain instances with malaria, typhoid fever, relapsing fever, venereal buboes, and other forms of adenitis. Mistakes are not likely to be made, however, if clinicians resort in every case they examine to a thorough routine clinical study of all the features presented. If malaria exists, the parasites should be found in the blood. If the case is one of typhoid fever, in the majority of instances the Widal reaction will be positive. If it is one of relapsing fever, the spirochetæ may be observed microscopically. It is to be remembered that there may be cases of combined infection--malaria with plague, and plague with relapsing fever. The writer was shown such cases in the Arthur Road Hospital in Bombay. In the same hospital, Khan Bahadur Dr. Choksey showed Dr. Flint and myself a form of plague in which there was an associated parotiditis, the plague bacillus probably entering the gland through the ductus parotideus. If there are venereal buboes, the size, resistance, and character of the tenderness of the enlargement will easily distinguish them from those met with in plague, and, further, in most instances, an initial venereal lesion will be discoverable. In all cases, including the various kinds of adenitis, the chief reliance must be placed upon the bacteriological examination of the lymph glands and of the blood from the spleen.

An infection with anthrax might be confounded with the cutaneous form of the plague, but here, again, the bacteriological examination, even of cover-slips, would suffice to differentiate the two diseases.

Plague pneumonia should not be confounded with croupous pneumonia. The sputum is decisive. It consists in plague pneumonia almost entirely of blood and plague bacilli. Microscopical examination of a cover-slip properly stained in carbol-thionin will reveal typical bipolar staining plague bacilli in enormous numbers. If the plague bacilli are few in number, or are mixed with other bacterial forms so that there is doubt with regard to its presence, a guinea-pig should be inoculated. It is emphasized by Childe that herpes is never present in a plague pneumonia.

If the first case seen is a septicæmic case it is very likely to go unrecognized until after death. The hemorrhages and phenomena of general sepsis in the absence of apparent cause will then excite suspicion, and the bacteriological examination will make the case clear. Nowadays, when cultures from the blood, *intra vitam*, are so often resorted to by clinicians for purposes of diagnosis in cases of general sepsis, we may hope for the discovery of plague septicæmia even *in a first case* during life.

Dengue fever, prevalent in certain districts, might, on account of the general tenderness over the lymph glands, be confounded with plague, but the characteristic exanthem and the mild course of the disease will usually permit one to recognize it even before a bacteriological examination has been undertaken to establish the absence or presence of the plague bacilli.

It must be borne in mind that the peoples among which plague occurs in epidemics live under such conditions that careful clinical and pathological examinations can be made only with considerable difficulty. Practice among the Chinese or among the Hindoos has, perforce, to be carried on in a much less satisfactory way than among Europeans or Americans. Where plague cases are actually known to be occurring in an Asiatic population the only safe method to pursue is to assume every case of fever among the living to be one of infection with plague until it is proved to be something else, and to regard every dead body as a plague cadaver until pathological and bacteriological examinations (including the inoculation of a susceptible animal) have demonstrated the absence of the plague bacillus.

TREATMENT. As to therapy there is but little to be said. The only remedy available in which any confidence is to be placed is the pest-serum of Yersin-Roux. The results obtained with Roux's serum at Oporto were very encouraging. Should the writer develop the disease he would wish to have this serum administered hypodermically in large quantities. Outside of the serum-therapy the treatment is wholly symptomatic.

As a prophylactic measure, Haffkine's inoculation is best for individual protection, though immunity for short periods appears to be afforded by injection of Roux's serum.

THE PATHOLOGY OF BUBONIC PLAGUE.[1]

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MY acquaintance with the bubonic plague dates from a visit to Hong Kong, made in the spring of the year 1899 while a member of the Commission sent by the Johns Hopkins University to study the diseases of the Philippine Islands. While engaged in outfitting in Hong Kong opportunity was afforded the Commission, by the courtesy of Dr. Lowson, the civil physician in charge of the Kennedy-town isolation hospital and the mortuary, to inspect those ill of plague and to witness and conduct post-mortem examinations upon those dead of the disease. During this period the several known varieties of the plague were observed. Bacteriological examinations were conducted and a small collection of pathological material made.

No especial use was made of the tissues collected in Hong Kong until recently, when, as a member of the National Commission[2] appointed to investigate the plague in San Francisco, another opportunity was obtained to study the disease and collect a supply of material. The study of this combined material, together with a record of observations upon the general pathology of the disease as presented especially in San Francisco, will form the basis of the present paper.

The epidemic of San Francisco is not traceable directly in a continuous chain of instances to any previous epidemic. The first case discovered in San Francisco, in March, 1900, was accidentally met with, and could not be connected with any previous example or precise infected locality. And yet the fact that the victim was a Chinaman places, with great probability, the source of infection in the Chinese epidemic which has continued without interruption for the past six or seven years.

The Chinese of San Francisco, as of this country generally, are Cantonese, who embark at Hong Kong for America. Although no new importation of Chinese into the United States is known to be taking place at this time, yet the constant travel kept up by those who return for a period to China maintains a continuous communication between our western shores and the southern part of the Chinese Empire. The shipments of food-stuffs, wearing apparel, and objects of art from Hong

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[1] Based on remarks made before the Association of American Physicians, Washington, May 1, 1901.

[2] The Commission was authorized by the Secretary of the Treasury, and consisted of Professors L. F. Barker, F. G. Novy, and myself.

Kong to America are constant, and constitute another bond of tangible connection between the two countries.

The first authentic account[1] of the appearance of plague in Europe is the great epidemic known as the Plague of Justinian, which in A.D. 542, starting from Egypt, spread to Europe and all over the Roman Empire, and which, lasting for fifty or sixty years, wrought the most frightful devastation. From that time until 1841, when the plague appeared for the last time in Constantinople, it recurred again and again in different parts of Europe, though latterly only in the southeastern parts of the Continent and in areas becoming gradually more circumscribed. In 1878 and 1879 a small epidemic, which speedily died out, broke out in the Russian province of Astrakan. With the latter exception and the recent limited epidemic in Oporto and Glasgow, Europe has long enjoyed exemption from the plague. America had never been visited until the recent appearance at Santos, Brazil, and the Argentine, and at San Francisco.

The mode of spread to America can best be followed by a consideration of the progress of the recent epidemics in Egypt, India, and China. Egypt, until 1899, had been exempt from plague since 1844, although several epidemics have since the latter date occurred in its neighborhood—in Tripoli (Benghasi), and on the Red Sea coast of Arabia (Assir), from 1853 to the present time. It is said to be endemic in Uganda and the *hinterland* of German East Africa (Koch). Many epidemics have occurred in Mesopotamia, Turkestan, India, China, and Mongolia.

In India there had been several outbreaks during the nineteenth century, but they had been of a localized rather than of a general character. Probably plague is always present in some parts of India, especially among the rude hill peoples. In 1896 it appeared in Bombay, and, possibly, in Calcutta, having been imported to the former city, most likely from Hong Kong.

It is now known that plague has been endemic in the southwest of China, in the province of Yunnan, for many years. It was particularly active in 1871 and 1873, after the great Mohammedan rebellion. From Yunnan, probably following the trade route, it spread to Pakhoi on the Gulf of Tonquin, a severe epidemic occurring in 1883 in that and in neighboring towns. In 1894 it had extended to Canton, where it killed, it is estimated, 60,000 in a population of 1,500,000 (?). Later in the spring of the same year it broke out in the English colony of Hong Kong, subsequently spreading to Macao, Swatow, Amoy, Foochow, Formosa, and probably many other places in the southern provinces of the Chinese Empire. Recently it has broken out in Mauritius, Madagascar, at Delagoa Bay and Cape Town, in South Africa; Osaka and Kobe, in Japan; Manila, in the Philippine Islands; Hawaii, in the Sandwich Islands, and, lastly, as mentioned, at San Francisco, in the United States.

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[1] This historical account is abridged and but little altered from the account of Manson, Tropical Diseases, 1900.

The evidence is complete and incontrovertible that the cause of plague is found in a specific bacillus discovered almost simultaneously by Kitasato and Yersin in the year 1894, during the prevalence of the epidemic in Hong Kong. The bacillus has a characteristic form; it exhibits a marked peculiarity in staining properties; admits easily of cultivation outside the body; readily and quickly undergoes involution upon artificial media, especially when concentrated so as to contain an increased quantity of salts (*e. g.*, chloride of sodium), and also in the tissues after degeneration and after removal from the body or death of the individual, if the examination be delayed for some hours, and is pathogenic for a wide range of animals, causing in them similar symptoms and lesions to those found in the natural infection in man and in the rat. As this paper does not pretend to deal with the purely bacteriological aspect of the plague, a brief reference only will be made to the morphological character of the bacillus.

As seen in recently affected and freshly removed tissues, in secretions or cultures, the bacillus of plague is a short rod, averaging 1.5 to 1.75μ in length and 0.5 to 0.7μ in width. The ends are rounded and the sides convex, the form, therefore, approaching an oval. From the typical form there are two variations: one is shorter and coccoid, the other longer and more definitely rod form. A third variation is ovoid, in which one end appears slightly thicker than the other. All the forms tend to exhibit bipolar staining, the mid-portion remaining unstained or staining more slightly. Complete and uniform staining may, however, be observed. In older pathological processes, and in older artificial cultivations, as well as upon concentrated media, various degenerative forms are found. These consist of oval, ovoid, almost circular, bladder-like, irregularly outlined and even bizarre bodies, which stain with difficulty, slightly, or even not at all, or stain at the margins and not in the interior. A not infrequent degenerative form resembles a dumb-bell or dough-nut (so-called "dough-nuts" of the San Francisco bacteriologists).

Staining is more readily effected in films than in tissues; but in both it proceeds relatively slow. Gram's method is negative. While all the common aniline stains can be employed for staining, the most useful results were obtained with carbol-thionin in weak solutions and after long immersion.

The present description is based upon the study of six cases of plague upon which post-mortem examinations were made. Unfortunately, with one exception—Case VI.—complete autopsies could not be made. The reasons for this deplorable fact will be found in the succeeding paragraphs, quoted from the official report of the Commission[1] appointed by the Secretary of the Treasury for the investigation of plague in San Francisco:

"In the study of the pathology of cases of plague met with among the Chinese in San Francisco a number of disadvantageous circumstances were contended with. In the first place, owing to the peculiar prejudices of this people—prejudices born especially of their religious beliefs and practices—permission for post-mortem examinations is given with great reluctance. The opposition to all mutilation of the bodies of the dead is so great that consent for necropsies was obtained only after assurance that the examinations would be limited strictly to the actual necessities for the establishment of the diagnosis of the disease.

"In the next place, there is no public mortuary in San Francisco to which the dead bodies were or could be carried. Such examinations as were made were conducted in the narrow limits of a dimly lighted alcove in an undertaker's shop, or in the even worse habitations where the dead were found.

"Under the circumstances the post-mortem examinations left something to be desired on the score of completeness, although in every instance the important question whether death was caused by plague was answered definitely."

The Post-mortem Examinations.[2]

CASE I.—Chun Ah Chou, actor, aged forty-four years, died February 5th in Washington Street Theatre. Body well nourished, two or three dark-bluish spots on legs (possibly hemorrhages). On palpation of neck, axillæ, and groins some enlargement of the lymphatic glands of the groin was made out, though nothing corresponding to an outspoken bubo was visible. Incisions were made in each groin, extending from Poupart's ligament about one-third the length of the thigh. The tissues on the left side were swollen and œdematous; the œdema was sero-hemorrhagic in character, and the lymphatic glands were hemorrhagic and greatly swollen. On the right side the œdema was less marked, and the glands, while distinctly enlarged and reddened, were less altered than those on the left side. Sections of the glands showed them to be uniformly hemorrhagic and swollen, and to contain frequent necroses visible to the naked eye.

The spleen was fully twice the normal size. It was softer than normal, the capsule was wrinkled, and the color deepened.

The examination of films from the glands, periglandular tissues, and spleen showed large numbers of bacilli decolorizing by Gram's method and presenting the morphology of B. pestis. Cultures and inoculations of guinea-pigs were also made.

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[1] Report of the Commission appointed by the Secretary of the Treasury for the investigation of plague in San Francisco, under instructions from the Surgeon-General, Marine Hospital Service. Washington, 1901.

[2] Free use has been made of the records of cases in the official report.

CASE II.—Lum Hong Yuen, cook and waiter in Chinese theatre. Illness of three weeks' duration. Said to have quit work on account of chancre and bubo three weeks before death. Four or five weeks prior to death he is said to have had a chill. On inspection of the body no evidence of a chancre could be found. In the inguino-femoral region a large mass of swollen, conglomerated lymphatic glands could be felt. Upon incision of the right groin from Poupart's ligament to the beginning of the middle third of the thigh serohemorrhagic periglandular œdema and uniformly enlarged and reddened glands were found. The amount of fluid was considerable, although there was enlargement of all the glands, some of them reached to the size of a horse-chestnut. On section these were of a deep red color and soft consistence. Necroses were present.

The spleen was enlarged to fully double the normal size; it was softened and of a deep bluish-red color.

Films from the glands and spleen showed large numbers of bacilli having the morphology and staining properties of B. pestis. Cultures and animal inoculations were made.

CASE III.—Wong Chi Lui, cigarmaker, aged forty-five years. Illness of two weeks. Complained of fever, loss of appetite, and general uneasiness. There had been pain in the groin and lower abdomen, for which a Chinese doctor had applied a plaster of honey and salve. No history of venereal disease. For three or four days prior to death the man was unconscious. On inspection and palpation a large mass of swollen glands was discovered in the left inguino-femoral region. On incision enlarged glands were revealed about the saphenous opening and in the groin. The largest gland had the size of an English walnut, and was of a dark reddish-brown color; it was soft and juicy in consistence, and mottled with hemorrhages and with grayish-white patches of necroses. The less swollen glands were markedly injected and contained hemorrhages. The periglandular tissue was very œdematous, fluid running freely from the incision.

The spleen was about twice the normal size, soft, and friable.

Films from the glands and spleen showed bacilli presenting all the properties of B. pestis. Cultures and animal inoculations as usual.

CASE IV.—Tom Shom, male, aged fifty-one years, actor in Chinese theatre. Had been acting in the theatre two weeks before, although it had been stated that he had not been well for from six to seven months previously. On February 4th he became seriously ill with fever and delirium. There had been some vomiting. On clinical examination, February 8th (Dr. Barker), the patient was found lying upon his back in bed, with legs drawn up. He was in a state of semi-stupor; pulse 108, quick, rather full, but of low tension. The skin was hot and dry. Respiration 20 to the minute. The face had an anxious expression. There was no palpable enlargement of the glands of the neck and axillæ, but in the right groin several enlarged glands could be distinctly felt, and tenderness existed. Died on February 10th. Examination at necropsy showed a slight swelling in the right inguino-femoral region which, on incision, revealed slightly œdematous subcutaneous tissue, with slight enlargement of the glands. The largest gland was the size of a filbert, and its surface was dark and hemorrhagic. On section it presented distinct hemorrhages. Other glands were swollen, soft, juicy, and hemorrhagic.

The spleen was enlarged, soft, and friable.

Films from the spleen and glands showed large numbers of bacilli having the characteristic properties of B. pestis. Cultures and animal inoculations were made.

CASE V.—Ung Ah Buck, aged forty-five years. The day before his death this man was seen alive and examined by Dr. Barker, who diagnosed the case, *intra vitam*, as one of cervical bubonic plague. The patient stated that he had been ill for two weeks. His neck had been swollen for one week, and the condition had been regarded as quinsy. The fauces were swollen and reddened, the swelling being very marked on the left side. The left palatine tonsil was much enlarged, and showed on its surface a grayish-white patch the size of a dime. The reddening of the throat was general, and there was less local injection than one ordinarily sees in diphtheria. On inspection and palpation of the left side of the neck marked bulging was found, due, it seemed, to enlargement of the cervical lymphatic glands. Autopsy: the left side of the face and neck presented a marked diffuse swelling, extending from the angle of the jaw backward to the sternocleidomastoid muscle, and below almost reaching the clavicle.

On incising this region the parotid gland was first reached; this organ presented a normal appearance. After dissecting away the parotid gland a group of greatly enlarged, deep glands, surrounding the carotid artery and jugular vein, came in view. The periglandular tissues were infiltrated with bloody fluid and presented a sodden appearance. The enlarged glands and portions of the surrounding tissue were excised; the former were found to be swollen (several reaching the size of an English walnut) and to be wholly altered in appearance and consistence. In color they were deep purplish, and on incision a hemorrhagic fluid exuded. Opaque points of necrosis were also present.

The general subcutaneous fat was well developed; there was no general œdema. The peritoneum appeared smooth and glistening; there was no fluid in the abdominal cavity, and the abdominal glands were not markedly swollen.

The spleen was enlarged to fully twice its normal size; it presented a purplish color and its consistence was diminished.

The pleural cavities were dry; the lungs retracted moderately upon removal of the sternum; the lower lobes were congested, but no consolidation was made out.

Films, cultures, and animal inoculations were made from the organs and tissues removed at this necropsy, consisting of the enlarged cervical glands and spleen. Cover-slips from the spleen showed large numbers of bacilli having the morphology and staining properties of the B. pestis. The films from the glands differed in their appearance. In some instances there were present large numbers of bacilli similar to those in the spleen, together with a few diplococci or short chains of cocci. Other cover-slips showed, beside the organisms mentioned, a bacillus having the morphology of the B. diphtheriæ.

CASE VI.—Foong Ah Fong, female, aged twelve years. No external signs of plague. The spleen only was examined (marked protest from child's relatives). It was enlarged to about twice the normal size, and was diminished in consistence. Films showed a very small number of bacilli of the size of B. pestis, although the characteristic polar staining was not observed. Cultures were made, and a portion of the spleen was introduced subcutaneously into a guinea-pig, with positive results.

The Histological Examination. The description of the microscopical appearances is based upon the study of the material collected in Hong Kong in 1899 and in San Francisco in 1901. The sections were prepared by Dr. Pearce, to whom my thanks are due. The material covers especially the bubonic cases, hence the descriptions will refer almost exclusively to the changes in the lymph glands and spleen. Tissues from two cases of tonsillar infection (one from Hong Kong) are also available for study. The animal tissues cover a wide range, and include all the organs except the central nervous system. They were obtained from guinea-pigs inoculated with bits of tissues and cultures in San Francisco, and represent the different experimental effects produced by the plague bacilli. Some of the animals succumbed quickly to septicæmic infection, others after many days, in which case pronounced local (bubonic) and visceral lesions were noted; in a few instances the animals were etherized in order to establish the diagnosis or to obtain intermediate effects.

Human Cases. As no histories were obtainable of the cases from which tissues were collected in Hong Kong, and none that were reliable from those in San Francisco, no attempt will be made to consider the disease with respect to its duration; but the degrees of severity of lesions will be described as exhibited by the grade of involvement of the organs studied. The chief distinctions will be afforded by the lymphatic glands, and they will depend upon whether the glands were primarily or secondarily affected. Primary involvement may be of two kinds: Of the first order, being the point of original reception of the virus; of the second order, representing the extension to a second contiguous group of glands. As might be anticipated, buboes of the second order are less marked than those of the first order. Secondary buboes may be found in any or all glands within the body, and at a distance from the primary lesions, infection having followed through the blood circulation. They present, as a rule, an example of involvement of least intensity.

Lymphatic Glands—Primary Buboes of Second Order. These glands show to the naked eye slight swelling and congestion. Upon microscopical examination, in the least marked cases, the changes affect especially the lymph sinuses. As might be anticipated, the subcapsular sinuses show very early involvement. Even when the medullary sinuses show very slight alterations the cortical sinus is dilated and contains numerous large cells, with round nuclei and finely granular and vacuolated protoplasm. These large cells quite completely fill the sinus. When the subcapsular space exhibits this condition, and it is present in glands that are regarded as scarcely enlarged, similar cells are to be found about the main trabeculæ in the interior (medulla) of the gland. That they are the cells that later show marked phagocytic properties for red blood-corpuscles is certain. In this early stage the lymph nodes and cords are little affected. There may be some increase in the lymphoid cells about the larger veins, but no very marked alterations have, as yet, taken place. There is complete absence of necrosis. Throughout the gland fine strands of fibrin can be seen, indicating doubtless an inflammatory (?) œdema. The bloodvessels contain light, fibrinous, possibly agonal or post-mortem thrombi. At a later stage, when the glands are definitely although not greatly enlarged, the changes are more diffuse and more profound. All the sinuses are much enlarged ; the cellular proliferation within the sinuses is also a marked feature, and the new cells are highly phagocytic exclusively for red blood-corpuscles. These cells cannot be distinguished from the red blood-corpuscle carrying cells of the spleen in typhoid fever. The lymphoid cells proper are also increased, beside which the centres of the lymph nodes and cords show a great increase in swollen and pale cells, their centres being converted into pale areas composed of cells of the epithelioid type. A small number of nuclear fragments also occur in these areas and chiefly within cellular protoplasm. The foci described are similar to those found in lymph glands and the spleen in other infections or toxic diseases—*e. g.*, diphtheria and typhoid fever.

The bloodvessels in the early stages of swelling contain an increased number of mononuclear and polymorphonuclear white cells. As the intensity of the process grows, their number increases. With the progress of the swelling, etc., the number of vascular thrombi increases and their nature changes. They appear in large vessels and contain many more white cells.

The relation of plague bacillus to these buboes is perhaps variable. What I should take to be the normal is a small growth, especially in the blood and lymph vessels, the bacilli demonstrable among the lymphoid cells being fewer. The bacilli exist free among blood-corpuscles and other cells. On the other hand, I have seen in buboes of the second order a growth of bacilli as great as in those of the first order. What is, however, very striking in these instances is the absence of anything like an adequate reaction on the part of the gland; and, moreover, the existence with as little reaction of equally large masses of characteristic bacilli in the periglandular adipose and other tissues. I am, therefore, inclined to view this abundant growth either as being agonal, or, what I think even more probable, as of post-mortem development.

Primary Buboes of the First Order. The pathological changes in these glands are unmistakable. They exceed in intensity and in extent those of the preceding order. They, moreover, differ in kind, first, on account of the occurrence of hemorrhage, and, second, on account of the necrosis. The two sets of lesions can be compared with difficulty on account of the degree to which the structure is lost by necrosis, etc., in the glands now being considered. Again, while the periglandular affection in the former order was slight, the outline of each gland being defined by its capsule, in the present one such sharp limits are entirely missing; the periglandular involvement is as great as the glandular affection, and the necrosis, hemorrhage, etc., are as marked. On account of the nature of the interglandular tissue, the presence of large blood and lymph vessels, nerves, etc., the histological appearances differ from those of the glands themselves.

In all the specimens of glands which I have examined no separation into the medulla and cortex is possible. Masses of lymphoid cells still remain, but they do not compose typical structures. That they are the relics of cortical structures their position proves; but they are not in relation with a definite systematic arrangement. The medulla is even more altered in that all the proper cells are necrotic. Only fragments remain of the large, swollen, phagocytic cells, and the intercellular stroma stains poorly or not at all. What can be made out clearly are granular material, containing remains of cell-forms, nuclear fragments in small numbers, shadows of red corpuscles, and plugs of finely granular structure, filling spaces which suggest pre-formed vessels, and which, from the regularity of the grains, can be recognized in the hæmatoxylin specimens to be bacilli. This granular and amorphous detritus is continuous with similar material in the cortex, only that in the latter situation small foci and islands of lymph cells still persist. This same regular, granular appearance mentioned proves that many bacilli occur throughout this entire area. Hemorrhages also exist in the cortical parts.

The bloodvessels commonly are thrombosed. The thrombi consist of cells, both mononuclear and polymorphonuclear, and fibrin. The walls of the smaller vessels often are hyaline and structureless. Specimens stained with the fibrin stain show a fine network about the vascular walls, occurring partly within the lumen, partly within the wall, and partly beyond in the perivascular tissues. Larger vessels show, instead of the fibrinoid transformation of their walls, destructive and infiltrative changes. The intimal and medial coats contain an increase of cells and many cell fragments. This infiltrative condition is especially marked in the middle coat. That many of these cells are polymorphonuclear blood cells is shown by the bizarre forms, etc., and the staining properties.

The periglandular structures are extensively infiltrated and usually show necrosis as well. The infiltration is partly cellular, partly fluid, along with which fibrin is perhaps invariably present. The cells consist of red corpuscles and small elements with single, deeply-staining, much fragmented, or polyform nuclei. The œdema and fibrin are found chiefly in the coarse, fibrous septa of the adipose tissue; the cells occupy the meshes of the fat cells. The necrosis may be microscopical in extent, affecting a small number of cells, or large areas may be without definite structure and present a granular appearance. The bloodvessels are frequently thrombosed, and their walls inflamed (as above).

The nerves are involved in the exudation. The cellular infiltration is found only in the perineurium, but this may be invaded to such an extent as to present the appearances of a small-celled collar surrounding the nerve bundles. The bloodvessels within the nerves are dilated; the nerves (in alcohol preparation) appear swollen, and the cells of the endoneurium are occasionally fragmented. Vessels with thin walls, presumably lymphatics, contain formless plugs in which there are many bodies taken to be bacilli.

Bacilli are abundant within the swollen glands and in the periglandular tissues. Sections stained in thionin show countless numbers. In no known bacterial infectious process, not even in leprosy, are such large numbers of bacteria to be found. They occur in continuous growth throughout the glands, occupying every available space; they completely occlude many bloodvessels, or, mixed with definite thrombi, compose a considerable part of the plugs. Moreover, the walls of the bloodvessels contain masses of bacilli, having grown, it is safe to conclude, within the vasa vasorum and the lymph spaces. The adventitial coats of veins and arteries are especially rich in such growths of bacilli. The bloodvessels and lymph vessels in the periglandular structures are also, to a large extent, occupied by bacilli. The latter seem to be plugged by these growths alone; the former may show bacterial masses, even when the vessel is still open and pervious. Large areas of finely granular detritus in the interstitial tissue are made up of a massive growth of bacilli; and the bacilli occur in the fluid exudate. The morphology of the organisms speaks unmistakably for the bacillus pestis.

The Tonsillar Infections. The buccal mucous membrane forms one of the portals of entry into the body of the plague bacilli. It is probable that the cervical buboes arise from that source of infection. Of all the buccal structures the tonsils seem to be most frequently the primary one attacked. In this fact we have only another illustration of the importance of incomplete epithelial investment and perhaps of previous disease in promoting infection. Other parts of the buccal cavity may become secondary points of development of the bacilli, an example of which is supplied by a case from which tissue was obtained in Hong Kong, and which shows early involvement of the epiglottis.

The tonsil suffers changes not unlike those described in the primary lymphatic bubo of the first order. There is congestion, hemorrhage, necrosis of cells, and extensive growth of bacilli. The degrees vary somewhat, so that examples of lymph sinus proliferation may be met with along with other changes of greater severity. The cells of the sinuses are somewhat smaller than in the lymphatic buboes; some resemble Unna's plasma cells closely, *and many are phagocytic for bacilli.* Of this there can be no doubt, for the protoplasm of these cells is packed with characteristic organisms. The bacilli are spread beneath the layer of stratified epithelium, even elevating this layer through the excessive growth, the epithelium showing vacuolation, loss of nuclei, etc.

The lesion of the mucous membrane covering the epiglottis is more recent than in the tonsil. It consists of a marked infiltration of small cells with single nuclei, polymorphonuclear cells, and serum. The infiltration extends to the layer of mucous glands next the cartilage, which are in part broken up by it. The chief growth of bacilli is near the surface, beneath the epithelium, which layer, it should be mentioned, is in part deficient. Occasional masses of bacilli occur in the deeper layers and even within the lumen of the glands. The appearances here presented are not unlike those described of the primary plague pustule.

The adjacent glands suffer along with the tonsils; their enlargement constitutes, of course, the cervical bubo. Two kinds of glands must, however, be distinguished in this region—lymphatic and hæmolymphatic glands. The former undergo the changes already described. In addition, it should be mentioned that even with considerable enlargement the alterations noted in one gland—the one constituting the main bubo—resemble closely those of the glands of the second order, except for greater richness in bacilli pestis. The lymph sinuses especially were affected; the cells were increased in numbers, enlarged, plasma-cell forms occurred, but phagocytosis was for bacilli only. The lymph node and cord cells were also increased, but not degenerated. Occasional mitoses were met with in larger (endothelial) cells.

The *hæmolymph* glands were greatly enlarged; the network of vessels enormously distended; much hemorrhage had taken place; nuclear fragments were scattered numerously throughout the tissue; a small number only of cells with undegenerated nuclei were still present; the periglandular tissue was hemorrhagic, and micro-organisms—bacilli—were abundantly present. In Case VI. of the San Francisco series the very hemorrhagic glands described consisted of these structures.

The Spleen. As already described, the spleen in the plague is enlarged moderately; the consistence is somewhat diminished, and the color deeper than normal, but it is not the type of the acute splenic tumor of the true septicæmias. In making this statement it is well to emphasize that although the spleen in the autopsies made all contained bacilli, often in very large numbers, the cases themselves were examples of the bubonic and not of the septicæmic variety, *per se*, of the disease. In a case of pneumonic plague which I saw with Lowson at Hong Kong the spleen was much swollen (three to four times the normal size), and very soft and dark.

It is probable that, irrespective of their mode of origin, all fatal cases of the plague are septicæmic (bacteriæmias). But it is also probable that the general invasion of the bacilli takes place late in many bubonic examples, and the enlargement of the spleen is, therefore, less marked a feature than in the primary septicæmias, or even the pneumonic variety, in which dissemination of the organisms occurs earlier in the course of the disease.

The microscopical changes vary in different cases, but in degree only, so far as can be determined by the study of bubonic cases. The alterations affect the pulp chiefly, next the lymph nodes (Malpighian bodies), and then the bloodvessels and stroma.

The pulp is swollen, the swelling being the result of cellular proliferation, cellular infiltration, and œdema. The proliferation affects especially cells closely united with the veins and surrounding the trabeculæ. These cells have reticulated nuclei, placed eccentrically, and a fair allotment of protoplasm taking the blue thionin stain. The cells are often polyhedrical rather than round. These cells have a close affinity to Unna's plasma cells. Next the lymphoid cells are increased, but to a less extent than the cells just described. The vascular and other (?) spaces in the pulp contain an increased number of red corpuscles. In the same spaces occur large cells of two kinds. One is a giant cell with single, lightly-staining, reticulated nucleus and a moderate amount of protoplasm, and resembling the large, mononuclear, narrow cell with which it is probably identical; it is not phagocytic. The other is a much larger cell, three to four times as large as the narrow cell, and is highly phagocytic. These macrophages englobe white cells—both mononuclear and polymorphonuclear—but rarely red corpuscles. They occur at times within the larger veins, especially such as exhibit the subintimal cellular proliferation to be described. The polymorphonuclear cells in the pulp exhibit great variation in form, and many would seem to have been in a state of active migration when the tissue was fixed. They show great variety of form, such as is seen in actively motile cells, and they would seem to be moving in numbers through the pulp. Fibrin, in the form of balls and fine strands, is found among the pulp cells and in the fluid, and many bacilli are present.

The Malpighian bodies are increased in size, the increase being due to the multiplication of the lymphoid cells, and, to a smaller extent, of epithelioid cells. The latter do not occupy the centres of the nodes, but are few in number and placed peripherally. Their nuclei are large and vesicular; rarely a cell contains two nuclei. Degeneration of cells is uncommon, very few fragmented ones being visible. Rarely small islands of fibrin are present in the nodules.

The bloodvessels show two kinds of change. The arteries, chiefly those of the Malpighian bodies, have hyaline walls; the veins of all sizes frequently show subintimal cellular proliferation. The cells in the intima are mononuclear and more rarely polymorphonuclear elements that form a continuous although not uniform investment, or appear as isolated projections into the lumen of the vessel. Above these cells the displaced endothelial cells can usually be detected.[1]

Bacilli are very numerous, especially in the pulp, where they grow diffusely and would seem to attach themselves to the reticulum and grow in irregular masses into the venous sinuses. They are rarely within cells. Their morphology is unmistakably that of B. pestis. They also completely occlude small bloodvessels, and, within the trabeculæ spaces, probably lymphatics. In that the richest growths are often unassociated with reactions, it is highly probable that they may have taken place post-mortem.

So few specimens of the remaining organs could be collected that no description of them will be attempted.

The Experimental Disease—Morbid Anatomy. As stated at the outset, the animal used for experiment was the guinea-pig. The inoculated material consisted of bits of spleen and lymph gland and cultures, upon agar, from those sources. The place of inoculation was the subcutaneous tissue of the lateral abdominal wall, nearer the inguinal than the axillary region.

The inoculated animals[2] can be separated into two groups, depending upon the results of the inoculation. These results in turn depended upon the virulence of the material—tissue or culture—inoculated, upon which also depended the duration of life following inoculation.

Types of Infection. The animals inoculated early in the course of the investigations in San Francisco died at periods varying from forty hours to eight days. Those inoculated later, and one or two inoculated with cultures early in the studies, but which had not succumbed, were etherized at the close of the work and subjected to post-mortem examination. According to the period of survival and virulence of the inoculated material, the appearances observed denoted (*a*) bacteriæmia without macroscopical localization in the organs, and (*b*) focal, nodular localizations in the internal organs. In all cases marked local lesions at the site of inoculation and in the adjoining tissues occurred.

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[1] This process is identical with that described by Hektoen in tubercular meningitis; Councilman in epidemic cerebro-spinal meningitis; Pearce in the spleen in scarlet fever; and Flexner in the lung in experimental leptothrix filiformic pneumonia in the rabbit.

[2] See Report of the Commission, p. 17 et seq.

Local Lesions. At the point of inoculation the tissues—skin, subcutaneum and sometimes muscles—were infiltrated with pus cells and presented a yellowish focus of necrosis. From this area as a centre the subcutaneous tissue, sometimes of one side, but frequently of both sides, was occupied by a gelatinous, hemorrhagic infiltration.

The lymphatic glands of the inguinal and axillary regions, even in the acute cases, were distinctly enlarged. In those animals which died after a longer period, or were killed from six to seven days after inoculation, the regional lymphatic glands were much enlarged, hemorrhagic, and even necrotic. The inguinal glands were, as a rule, more swollen than the axillary.

The Spleen and Liver. In the instances of rapid death (bacteriæmia) the spleen was moderately enlarged, its color was deepened, its consistence decreased, but no focal lesions were visible to the naked eye. In this class of cases the other organs failed to show focal lesions. The lungs appeared mottled only, and a few small necroses existed in the liver; numbers of bacilli were contained in all the viscera and in the heart's blood.

The focal lesions in the spleen consist of grayish-white nodules, larger than a millet-seed in size, covering the surface (within the capsule), and occupying the substance of the organ. When the nodules are numerous—*e. g.*, in animals succumbing from the sixth to the eighth day, or after etherization at that period, when there has been a marked local reaction—the spleen is greatly enlarged, perhaps five to six times its normal size, and its color is pale. The main mass is composed of the nodules now almost or actually confluent which, having penetrated the peritoneal capsule, are covered on the surface with a fibrinous exudation.

The liver invariably shows lesions when death has been delayed a few days. The common ones are focal necroses of varying size. These are yellow in color, and in size ranged from that of a pin's point to linear and wedge-shaped areas three to four millimetres in length. Only rarely did whitish nodules similar to but smaller than those noted in the spleen occur.

The Lungs. They present a variety of appearances, only one of which was characteristic. Sometimes they showed no gross lesions; not uncommonly they are mottled and contain small ecchymoses beneath the pleura; rarely they contain scattered whitish nodules resembling those of the spleen, except that they are smaller and tend to be surrounded by a zone of recent hemorrhage. No effusions into the pleura were noted.

Subserous Hemorrhages. These are common, especially in the peritoneum, where they occur beneath and within the serosa of the large intestine, and in the pleura covering the lungs. They are usually small in size, although at times, through confluence, they reach larger dimensions. However, considerable exudations or effusions into the serous cavities did not arise from this source.

The other organs, except the adrenal glands, showed no special changes to the naked eye. The adrenals were uniformly congested, and often very dark in color.

The central nervous system was not examined.

Histological Examination[1]—*Local Lesions.* This embraces (1) the site of inoculation, and (2) the adjacent lymphatic glands. 1. Upon microscopical examination it is found that the abdominal muscles are involved in the local infection. The lesion consists of necrosis, extensive infiltration, and proliferation of the local tissues. The infiltration exceeds the necrosis, but the proliferative changes are considerable. The necrotic tissue is infiltrated with cells containing polyform and fragmented nuclei, many staining very poorly. Among these a fair number of cells with single vesicular nuclei are also found, they probably arising from the fixed tissues. The cellular and necrotic mass is surrounded by voluntary muscle, fibrous, and adipose tissue. Remains of these several tissues may also be found in the phlegmon, especially fragments of muscle; but the adjacent muscle fibres are swollen, sometimes fragmented, and if the phlegmon is large much compressed and elongated. But the main change is found in connection with the sarcolemma, which is in active proliferation, separating widely the remaining fibres in the older specimens, and giving rise to a marked interstitial myositis. The adipose and connective tissues are also in active proliferation. Newly-formed bloodvessels are numerous, and the phlegmon is enclosed by the new tissue.

Notwithstanding the evidences of healing and the marked reaction, the number of bacilli present is very great. They appear in large clumps and in the form of a diffuse growth, not only in the phlegmon, but also in the adjacent newly-formed tissue, and are largely without cells.

2. The lymphatic glands show degrees of swelling, etc., in part according to their positions, and depending upon their mode of infection. Division into primary buboes of the first and second order is also justifiable in animals. The main lesions consist of hyperæmia, cellular proliferation, exudation, and bacterial growth. The cellular proliferation and bacterial development predominate. The former is met with in the medulla and the cortex, and affects lymphoid cells (in the cortex especially), and a larger cell with eccentric nucleus and more abundant, deeply-staining protoplasm (chiefly in the medulla). The larger glands (primary buboes of first order) show much necrosis, the cells being extensively fragmented. In these, moreover, fibrin is present, both as fine fibrils throughout the gland and in the form of more compact masses within the vessels. As many of the plugged vessels are in the medulla, occupy the position of the lymph sinuses, and are devoid of red corpuscles, they are taken to be lymphatic vessels. The periglandular tissues are invaded also. Infiltrations, exudations, and necroses are met with in the cellular and adipose tissue; bacteria are also numerous. The bacilli in the main buboes are as numerous as in cases of human infection, and have much the same distribution. An exception is found in the less conspicuous involvement of bloodvessels in the experimental buboes.

The Spleen. There is little similarity in this organ in the human and experimental disease. The sole diffuse change in the latter is congestion, which is often so marked a feature as to cause wide dilatation and make very conspicuous the blood sinuses of the pulp. The white cells also are increased, and especially a large mononuclear cell. The

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[1] The histology of experimental plague lesions has received relatively little attention. The main description, with the facts of which the above is in considerable agreement, is given by Babes and Livadite in Virchow's Archiv, 1897, Bd. cl. p. 343.

Malpighian bodies are but little altered. Unless there have been nodular formation in the spleen little else is found except bacilli, which may be abundant, especially in the pulp.

The localized nodules are what constitute the characteristic lesion. They consist of a central body of bacilli about which are grouped cells and remains of cells, forming collections as large as or larger than the Malpighian bodies. The bacilli may form a central mass with radii projecting from the periphery, or the development may have taken place from several centres, the latter being united by intervening strands. The cells surrounding the bacilli are in part mononuclear elements, having vesicular nuclei; but in the main they are polymorphonuclear, fragmented, and degenerated cells. In one specimen, areas composed only of mononuclear cells, but with slight bacterial development only, were observed. Fibrin is present about the areas, within the vessels, and in the tissues. The quantity of fibrin varies in the different specimens.

From the position of the bacilli it would appear that they developed in bloodvessels, which finally became occluded. Following this cellular proliferation doubtless took place, although previous degeneration of splenic tissue may have occurred. The degeneration of the new cells seems to have provoked a rich emigration of leucocytes toward the areas of bacterial development. The bacteria are free, without cells. In addition to the masses (emboli?) of bacilli a general diffuse growth of organisms is also present in the splenic tissue.

The Liver. The focal lesions of this organ consist, beside rare hemorrhages, of necroses and nodular formations not unlike those found in the spleen. Of the hemorrhages, which do not reach a large size, it is unnecessary to speak further; the necroses are, however, important. The latter are separable into two groups: those attended and those unattended by proliferative phenomena. Together they constitute the necroses described as visible on the surface of the organ as dots and lines. Similar ones may be present also in the depth, and in both the liver cells are found in various stages of hyaline or coagulative necrosis. The protoplasm is highly refractive, shows an increased affinity for eosin, the nuclei of the cells may be absent, in a state of pyknosis, or fragmented. Remains of previous vacuolization or fatty change may be discovered in the liver cells. A small number of leucocytes may occupy the capillaries between the cells. Bacilli are sometimes demonstrable in the sections among the hyaline cells, sometimes not. They doubtless are always present, but not clearly stainable. Thrombi are usually absent.

A more characteristic lesion is found in the nodules with which necroses of liver cells are usually associated. The nodules vary in number, position, and size in different specimens. In some instances they were entirely absent, although the simple necroses existed. They are associated, perhaps invariably, with considerable growths of bacilli, forming zooglea masses, which occupy the centres of the nodules. About these there is a rich cellular accumulation, which I take from the study of many sections to arise as follows: The bacilli having localized within the liver, a multiplication of the endothelial cells of the neighboring capillaries takes place. As these cells—presenting epithelioid appearances—increase the adjacent liver cells also begin to show alterations, among which are swelling and vacuolization of protoplasm, multiplication of nuclei, compression of protoplasm, and hyaline degeneration. A little later stage exhibits the disappearance of many of the liver cells, their place having been occupied by the epithelioid cells, so that the new formations at this time look not unlike miliary tubercles. One difference is, of course, immediately noticeable, the bacilli being numerous and easily demonstrable. Another difference is found in the tendency of the node to enlarge by exciting the adjacent structures to similar proliferative activity. Finally, the large size of the nodules and the extent and irregular distribution of the liver necroses constitute marked differences from the appearances seen in tuberculosis. Moreover, there is no caseation in the nodules, or any process to be confounded with it, although disintegration by fragmentation of cells commences very soon. About this time polyform cells, probably polymorphonuclear leucocytes, make their appearance and mingle with the other cells. In the oldest nodules nothing remains of unaltered or only slightly changed liver cells in the centres of the formations.

The nodules may occur anywhere within the liver lobule and in the interlobular tissues. Thrombi, hyaline and fibrinous, may be present in the adjacent veins and capillaries. The cellular proliferation and infiltration, instead of giving rise to a definite node, may extend in a linear direction along the walls of bloodvessels or bile vessels. In the former the endothelial lining of the vessels tends to increase. In one specimen a considerable linear envelopment was noticed along one side of a medium-sized branch of the hepatic vein.

The effects of the presence of the bacillus pestis in the liver of guinea-pigs is to cause general and local degenerations, and, by their occurrence in large numbers, to excite circumscribed proliferation of the endothelial cells and perhaps, although only to degenerate quickly, the liver cells. The lesion which results from the latter process is the characteristic plague lesion in the liver, and corresponds more or less accurately with the focal lesions in the spleen. It is the result of the direct action of the bacilli or their metabolic products *in situ*. The more remote effects of the bacilli are degenerative only.

The Lungs. Subpleural and intrapulmonary ecchymoses are not uncommon. The characteristic lesion is, however, focal and nodular. In number, size, and distribution these nodules are subject to great variation. They may be absent altogether, very few may be present, or every section of the lungs may contain a dozen or more. They may be near or within the pleura, in the substance of the lungs, or adjacent to bronchi. In size they vary from the area of two or three to areas of twelve or more pulmonary alveoli. Bacilli in masses are always present. They are within the alveolar spaces and in the pulmonary capillaries. About these are cells, the major being within the alveoli, and consisting of or resembling the alveolar epithelium. Cells with polyform nuclei and cell fragments are intermingled. The stroma is also infiltrated with similar cells. The larger the nodules the more irregular in form the cells, and the greater the number of fragments. Beside the bacilli within the nodules a growth may also have taken place in pulmonary capillaries, about which there may have been no considerable cellular accumulation.

The adrenal gland shows extensive hemorrhage, marked especially within the medulla, the structure of which is greatly disturbed. The cortex, on the other hand, exhibits an extensive growth of bacilli, which run between and surround the cortical cells and occupy spaces beneath the capsule of the gland. Isolated masses of bacilli are also present in the medulla.

The present epidemic of plague in China and India has been noteworthy, first, because of the discovery of the specific cause, and, second, as permitting accurate studies of the varieties, modes of infection, prophylaxis and specific treatment of the disease. A host of contributions to our knowledge of the plague have been made by private individuals and Commissions sent to the East by Japan and several European countries. Brief reference will be made in this place to the pathology of the disease, as described in some of the published reports, in order that comparison may be made with the San Francisco epidemic which supplied the chief materials for the present paper.

According to the German Commission[1] the pest bacilli find their way into the body either through wounds of the skin or by way of the lungs. The first mode of infection gives rise to the great majority of the cases. It is presumed that minute lesions—scratch wounds, etc.—open the way. No unmistakable example of intestinal infection was observed, while, on the other hand, instances of infection starting from the tonsils or other parts of the buccal mucous membrane were encountered. In a considerable proportion of cases pustules or carbuncles of the skin, representing the primary points of entrance, from which the regional lymph glands became affected with bacilli, were noted, and between the two stations distinct lymphangitis is said to have occurred. Bubonic plague may eventuate in absorption, in suppuration, or it may be associated with severe symptoms denoting spread of the infection or a general intoxication of the organism. The hemorrhages which are present in various parts are due to intoxication, in support of which conclusion an instance of the examination of a fœtus expelled on the third day of the disease is cited. In it typical hemorrhages were present, but no bacilli whatever could be demonstrated in cultures, etc. Bacilli were not, moreover, obtainable from petechial blood. The commission also recognized a severer form of the plague—the pest septicæmia—and in addition a primary plague pneumonia that may be mistaken for croupous pneumonia.

The report of the Austrian Commission[2] differs in some respects from the German, and it is important as containing extensive descriptions of the gross and microscopical appearances of the organs in the plague. The report was based upon the clinical observation of seventy cases of plague and the bacteriological and pathological examination of forty-seven cases. The chief form of plague is denominated by them "septicæmic hemorrhagic." It is characterized by a primary hemorrhagic bubo located most frequently in the inguinal, axillary, and cervical regions, about which there occurs a hemorrhagic œdema, and at a greater distance hemorrhages into the organs. The spleen is swollen, the general lymph glands are enlarged, and the parenchymatous organs show degenerative changes. The primary bubo may be entirely wanting, the swelling of the lymph glands may be inconspicuous, and the hemorrhage may be the only pronounced sign. A second form of the pest is the septicopyæmic. In it embolic foci are present in the lungs, liver, and kidneys. A third form is the primary pest pneumonia, which is a confluent lobular pneumonic process, usually attended with noticeable lymphatic enlargement. The common place of entry of the bacilli is the skin, but only exceptionally can the precise point of entrance be discovered, the demonstration of the place and mode being found in the location of the primary bubo. The lymphangitis in the neighborhood of the buboes as well as the infiltration of the periglandular tissue are always secondary to the glandular infection. A tonsillar infection is described, and the lungs are admitted to act as the portal of entry for the bacilli in a small number of cases. A single instance of purulent meningitis, due to the bacillus pestis, was encountered. Clinically, there should be distinguished only bubonic and pneumonic forms of the plague. The former is much the more frequent. In all but a very small number of cases the primary morbid focus is found in a lymph gland or a group of glands (primary bubo) from which, through lymphatic communication, the adjacent glands become infected. The latter constitute the primary bubo of the second order, in contradistinction to secondary buboes, the result of general invasion of the body by the bacilli. The invasion of the blood takes place always from the primary bubo (or lung), as a primary blood infection does not exist. The primary bubo may be so small that it cannot be discovered clinically, and is found anatomically only after careful and prolonged search. In *foudroyante* cases it may fail altogether.

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[1] Mittheilungen der Deutsch. Pest-commission aus Bombay, etc., Deutsch. med. Wochenschr. Sonderbeilage zu No. 17, 1897; Weitere Mittheilungen der Deutsch. Pest-commission, ibid., Nos. 19, 31, 32, 1897; Gaffky, R. Pfeiffer, Sticker, und Dieudonné: Bericht über die Thätigkeit der zur Erforschung der Pest in Jahre 1897 nach Indien entsandten Commission, Arbeiten a. d. Kaiserl. Gesundheitsamte, 1899, Bd. xvi..

[2] Zusammenfassender Bericht über die Thätigkeit der von der Kaiserlichen Akademie der Wissenschaften in Wien zum Studium der Pest nach Bombay entsendeten Commission (Wiener klin. Wochenschr., No. 20, 1897; Müller, Albrecht und Ghon, Ueber die Buelenpest in Bombay in Jahre, 1897. Gesammtbericht der von der Kaiserl. Akademie der Wissenschaften in Wien zum Studium der Buelenpest nach Indien entsendeten Commission. Theil 1 und 2, A und B, Wien, 1898-99).

The primary bubo is distinguished by destruction of the lymphatic parenchyma, necroses, hemorrhages, and (in the cases of mixed pyogenic infections) suppuration. A similar condition is found in the surrounding cellular tissues. Bacilli are present in great numbers. The secondary buboes show, on the other hand, uniform hyperæmia, occasional hemorrhages, and, in the more protracted cases, medullary swelling. The primary buboes of the second order approach one or the other of these appearances, depending upon their distance from the gland primarily affected.

The multiple hemorrhages are not the results of the action of toxins elaborated at a distance, but are caused directly by the bacilli which may always be found in the neighborhood.

Parenchymatous and fatty degenerations of the heart, liver, and kidneys occur commonly. Splenic tumor is a constant occurrence. The spleen shows marked changes. The pulp is distended with blood, and contains many polymorphonuclear cells. The follicles are but little altered, but the trabeculæ are swollen and homogeneous. In some instances the endothelial cells of the pulp have proliferated and desquamated. When very great numbers of bacilli are present miliary necroses may occur (also oberved by Yamagiwa).[1] The bacilli may be very abundant in the pulp, but are spare in the follicles. They are sometimes contained within cells.

In the pyæmic variety metastatic foci are found in the liver, lungs, kidneys, spleen, and musculature. These foci, which may reach a hazel-nut in size, resemble abscesses, except that they tend to be surrounded by a zone of hemorrhage. In about one-third of all the cases of plague secondary pyococcal infection has taken place.

The primary plague pneumonia appears in the form of a lobular consolidation, which, when the foci are numerous and confluent, may produce lobar solidification. Bronchitis is present. The bronchial lymphatic glands present appearances of primary, the other glands of secondary buboes. In addition to the primary two other forms of pest pneumonia are recognized; one metastatic, which appears as multiple and larger foci, seated beneath the pleura; the other an aspiration pneumonia, from inspirations of infected material obtained from buccal buboes.

Wyssokowitz and Zabolotny,[2] who were sent by the Russian Government to Bombay, performed autopsies upon twenty-four plague cadavers. They recognized two modes of infection—from wounds and through the lungs. In the former cases lymphangitis was usually missed, so that the exact place of entrance could not always be given; on the other hand, the territory of infection could be determined by consideration of the glands primarily involved. In their series of pneumonic cases (six) all were examples of bronchopneumonia. In no instance was a gastro-intestinal source of the infection noted. While the mesenteric glands were swollen they did not present the appearances of primary buboes.

Wilm[3] examined a large number of pest cadavers in Hong Kong.

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[1] Ueber die Bubonen-pest, Virchow's Archiv, 1897, Bd. clix. p. 159, supplement.

[2] Recherches sur la peste bubonique, Annales de l'Inst. Pasteur, 1897, t. xi, No. 8.

[3] Ueber die Pest-epidemic in Hong Kong in Jahre 1896, Hygienische Rundschau, 1887, Bd. vii., Nos. 5 and 6.

Especial attention is drawn to the involvement of the gastro-intestinal tract. The solitary and agminated intestinal lymphoid nodules were generally swollen and hemorrhagic, and the mesenteric glands were found swollen, softened, and mottled with hemorrhages. Wilm claims to have found in 20 per cent. of the cases without external buboes that the stomach and intestine were predominatingly affected. This observation thus far stands alone and in opposition to the experiences of other writers.

The two main types of the plague—the bubonic and pneumonic—may be considered as established by the observations made during the present epidemic. Additional confirmation of the studies in China and Hong Kong have recently come from Japan[1] and Sydney, N. S. W.[2] Viewed by the light of the experiences in other places where the plague has gained even a temporary foothold, the absence of the pneumonic disease from San Francisco is the more remarkable. In all places where plague has secured a start evidences of rat infection and probable rat dissemination have been brought forward. It is, therefore, the more strange that in San Francisco, even after a year's prevalence among the Chinese, no evidence of a similar infection of vermin has been obtained. An attempt was made by the National Commission to determine whether the rats in Chinatown harbored the plague. Only one dead rat was obtained for examination, and it proved negative. This animal showed signs of traumatism about the body, and may have been killed by a dog or by other violence. About one dozen rats were caught in traps in the sewers in the Chinese quarters. They were fed and kept under observation for about two weeks, during which time only one died. Upon examination this animal gave a negative anatomical and bacteriological result. The others were killed but not examined.

It is, therefore, safe to assume that no considerable if any spread of the plague due to the rats in Chinatown has taken place. And it seems not unjustifiable, judging from the experiences of other infected places, to ascribe the limited and localized character of the San Francisco outbreak to the present immunity of the rat population.

A comparison of the natural disease in man and the experimental disease in guinea-pigs, as it existed in San Francisco, with the descriptions of the natural and experimental disease as observed in other places, will supply immediate conviction of the identity of the pathological processes. The gross lesions are characteristic and unmistakable. Moreover, the main features of the natural disease in man and the rat are easily and constantly reproducible by experimental inoculation. The histology of the lesions in man and animals is also in considerable accord. The primary buboes are practically identical; the necroses in the liver and spleen are easily comparable, and while, however, the proliferative nodules in the spleen, liver, and lungs in guinea-pigs may not have an exact counterpart in man, perhaps closer study of the pyæmic (metastatic) lesions in man may show that, beside necrosis and suppuration, considerable cellular proliferation has taken place. The minute changes in parenchymatous, proliferative, and emigrative cells—degenerations, necroses, etc.—are indistinguishable in man and animals.

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[1] Kitasato, Bericht über die Pest-epidemie in Kobe und Osaka, Tokio, 1900.

[2] Report of the Outbreak of Plague at Sydney, 1900.

When, therefore, the pathological anatomy, bacteriology, and the results of experimental inoculations are carefully considered, it is not easy to see by what means a part of the medical profession of San Francisco was and continues to be misled as to the nature of the epidemic disease prevailing in the Chinese quarter of that city. It is, however, due to the profession of San Francisco to state that this small number was far outweighed by those physicians who were convinced that the pest existed and expressed themselves accordingly. Among these were the bacteriologists and pathologists of the city almost without exception.

In conclusion, it is a pleasure to acknowledge the many favors conferred upon the National Commission by the local medical profession of San Francisco, and the great assistance in the scientific pursuit of the work rendered by Drs. Williamson, O'Brien, and Kellogg, of the City Board of Health, and Dr. Wilson, district physician.

THE BACTERIOLOGY OF BUBONIC PLAGUE.[1]

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Since the studies of Yersin upon plague in 1894 the bacteriology of this disease has been the subject of numerous exhaustive investigations, not only by independent workers, but also by special Commissions which European governments, namely, Austria, Germany, and Russia, have sent to India. As a result, the biological properties of the bacillus pestis and its effects upon experimental animals are well known. In a remarkably short time the chief etiological factors in bubonic plague have been revealed and effective means have been provided in Haffkine's vaccine and Roux-Yersin's serum which, together with careful isolation and thorough disinfection, have rendered it possible to check the spread and even to cure this disease. There are, however, many questions in the epidemiology of plague which still await a satisfactory explanation. It is not the purpose of this paper to enter into the consideration of such questions, but rather to present the bacteriological studies made by the United States Commission in San Francisco, together with subsequent experiences with the plague bacillus at Ann Arbor.

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[1] Read before the Association of American Physicians, Washington, May 1, 1901.

Owing to the manifold clinical features presented by the plague it will be readily seen that the greatest importance attaches to the demonstration of the presence of the pest bacillus. As is well-known, the most common type of the disease is that in which there are more or less marked enlargements of the lymphatic glands. Such buboes are usually met with in the femoral or inguinal regions, less frequently in the axillæ or in the neck. A well-marked bubonic case of plague offers no difficulty in the way of diagnosis. But, on the other hand, it must be remembered that there are cases of plague, septicæmic in character, where little or no glandular enlargement can be detected. An instance of this kind was met with by the Commission where, although the patient (Case VI.) was seen during life, it was only after the bacteriological examination of the spleen, and more particularly the positive animal experiment, that it was shown to be a case of plague. The pneumonic type of the disease was not met with by the Commission.

The detection of the plague bacillus during life is possible, but at times rather difficult. In the case of a well-defined bubo it is feasible to introduce a hypodermic needle, and in this way remove a few drops of the fluid from which cover-glass preparations and cultures may be made, and in the experience of the German Plague Commission such procedure frequently revealed the presence of large numbers of plague bacilli. At San Francisco in one living case the attempt was made to detect the plague bacillus in this way. The result in that case was negative both culturally and microscopically. The failure was undoubtedly due to the fact that the needle did not actually pierce the small gland. In suppurating, discharging buboes it frequently happens that either the pus will be perfectly sterile or it will contain only streptococci and other pyogenic organisms.

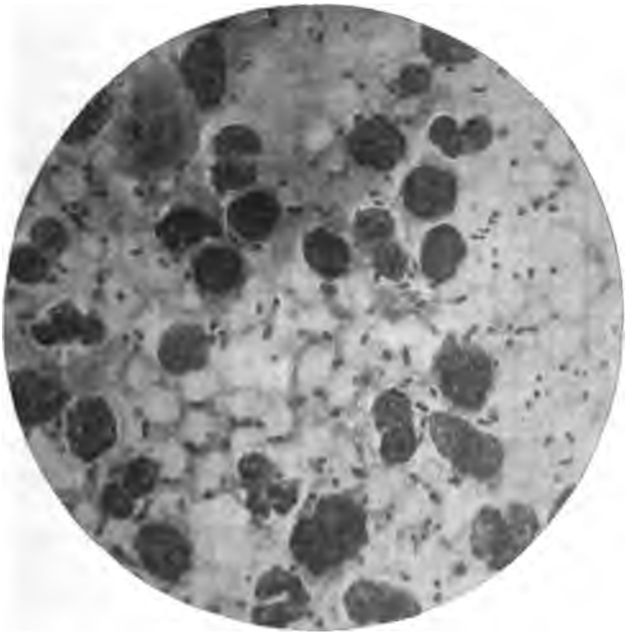
In very severe forms of plague, and, of course, in the septicæmic type, plague bacilli are present in the blood. A few drops of blood taken from the finger or from the ear lobe can be used for an examination. The number of bacilli in the blood during life is necessarily small, and for that reason their detection by direct microscopical examination is very difficult. In the experience of the German Commission, frequently where the cover-glass preparations gave negative results, the cultural methods were successful. Of 124 cases thus examined, 81 gave negative results. It is evident, therefore, that a mere examination of the blood cannot be relied upon as a means of diagnosis. The case already mentioned, where an attempt was made to discover the plague bacilli in an enlarged gland two days before death, was also used for a blood examination, but with equally negative results. Only a drop of blood was used in this trial, and it is quite probable that if one or two cubic centimetres of blood had been drawn from a vein by the aid of a syringe and the amount spread over a series of agar tubes or over agar plates the result might have been otherwise.

While there is more or less uncertainty in the detection of pest bacilli *intra vitam* in the enlarged glands and in the blood of plague patients, no such difficulty is experienced in the pneumonic form of the disease. The blood-streaked sputum in such cases is, according to the experience of numerous observers, invariably rich in bacilli. A case of primary pneumonic plague which resulted from accidental laboratory infection was recently under my observation, and in this instance a microscopical examination gave an early and definite diagnosis.

In the investigation at San Francisco the Commission was fortunate enough to meet with six cases of plague. Three of these cases were seen during life, and the other three were not seen until after death. In not one of these cases did the attending physician, whether Chinese or white, call the attention of the city Board of Health to the possibility of plague being present. Indeed, this has been the history of nearly all the known plague cases in San Francisco. It was in view of the difficulty of obtaining reliable reports from the Chinese as to their sick as well as the difficulty of making satisfactory diagnoses of plague during life, or even post-mortem, that the Commission was led to formulate a recommendation which seemed to them of the very greatest importance. It was recommended that every Asiatic who had fever should be suspected as a case of infection with plague until the disease was proved to be other than plague, and every dead body should be treated as a plague cadaver until a bacteriological examination had proved the absence from the body of the bacillus pestis.

A bacteriological examination of the enlarged glands, if there are such, should be made. In several of the bodies examined at San Francisco the glands contained enormous numbers of pest bacilli, whereas in others they were less abundant. On the other hand, the spleen in five out of six cases was exceedingly rich in plague bacilli, and in only one case (Case VI.) were these present in such small numbers as to be easily overlooked in a cursory examination. Nevertheless, a guinea-pig inoculated with this spleen died in the usual time. This experience indicates the necessity of recourse to animal inoculation whenever the microscopical examination fails to give a direct and unequivocal answer. In this connection I may cite the experience of the German Commission, which, by means of the animal experiment, repeatedly demonstrated the presence of plague bacilli, although microscopically and culturally they could not be detected.

Streak preparations from the spleen or glands were usually stained with Löffler's methylene blue or with carbol-thionin. Where care is taken to avoid overheating the specimen while fixing little difficulty is experienced in obtaining the characteristic bipolar stain. Inasmuch as methylene blue is likely to overstain it should not be allowed to act for more than a few seconds. A typical preparation from a plague case will show enormous numbers of pest bacilli which are invariably single. (See Figure.) These should be examined under as high a power as possible. A $\frac{1}{12}$ oil-immersion objective and No. 4 eye-piece will show clearly the rounded ends of the short, thick bacillus, and in addition will bring out definitely the bipolar character. As is well-known, the plague bacillus is not stained by Gram's method.



The typical short, thick bacillus is the only form met with when perfectly fresh organs of man or of animals are examined. When, however, the autopsy was delayed for some hours after death, as was not infrequently the case, a peculiar modification was to be seen. A preparation made from such material would show, beside the usual bacilli, large oval or roundish bodies which may be considered as involution forms. These peculiar modifications, as a rule, do not stain evenly, but instead show a light centre surrounded more or less completely by a deeply-stained ring or border. Because of this peculiarity they have been spoken of not inaptly as "dough-nuts." These degenerative forms were met with in considerable number in several of the cases studied by the Commission, and were absent in but one instance (Case VI.). It may be stated incidentally that the German Commission met with these same degenerations in Bombay. As already indicated, the "dough-nut" form can be produced in animals, provided these be kept for twelve to twenty-four hours in a warm place. As is well-known, the plague bacilli are remarkably prone to develop roundish, pear-shaped, or yeast-like involution forms on dry, and especially on salt, agar.

The isolation of the plague bacillus from the fresh cadaver offers, as a rule, no special difficulty. It is very important to have a slightly alkaline medium, inasmuch as even a faint acidity exerts a marked inhibitory effect. This fact is often demonstrated in the laboratory in a most unwelcome way when such media after profuse inoculation with unquestionably viable cultures show no sign of growth. Agar plates or tubes streaked with fresh tissue invariably yield good growths, provided that the number of pest bacilli in such tissue is not too small. When only a few organisms appear to be present it is advisable to use a larger amount of material for inoculation. As a matter of fact, even when the tissues are extremely rich in pest bacilli the number of colonies which develop on agar is often considerably smaller than might be expected, showing that many of the organisms are considerably enfeebled. This condition is especially met with when tissues are derived from animals which have been dead for many hours. The involution forms which are present in such cases are apparently incapable of development on artificial media.

The inoculation of such material, however, into a susceptible animal will cause death, and from the fresh organs thus obtained cultures can be readily secured. As will be indicated presently, the guinea-pig can hardly be considered as among the most susceptible animals.

The cultural characteristics are well-known, and need not be elaborated upon in this connection. They are, moreover, described, though briefly, in the appendix.

For the purpose of diagnosis the direct microscopical examination is, as a rule, sufficient. When, however, the pest bacilli are very few, or when other organisms are present which tend to mislead in the identification, it is then necessary to resort to animal inoculation in order to arrive at a satisfactory conclusion. A portion of the gland or spleen should then be introduced under the skin of an animal. The common rat, in the experience of others, is by far the most susceptible animal, and should be used whenever possible. Inasmuch as rats were with difficulty obtainable at San Francisco, the experimental inoculations were confined to guinea-pigs, which usually died in from three to five days after such inoculation. Exceptionally, a guinea-pig may die in thirty-six hours or even less, and I have repeatedly observed death to be delayed for ten or twelve days. This is especially true when pure cultures rather than bits of tissue are introduced into the animal. It may, indeed, happen that pure cultures, recently isolated from man or animals, will fail to kill guinea-pigs.

The failure at times of pure cultures of pest bacilli to kill guinea-pigs indicates in the first place the labile character of the virulence of these organisms when grown on media which have an even slightly unfavorable composition or reaction. Moreover, it shows that the guinea-pig offers considerable resistance to infection, and that the survival of such an experimental animal does not positively exclude the presence of plague bacilli. The virulence of these organisms can often be restored by frequent transplantation to fresh distinctly alkaline media, and especially by the use of the collodium sac method.

The effects observed in guinea-pigs varied somewhat with the duration of the disease. Where death occurred in less than two days little or no structural change was observable. Usually, as a result of subcutaneous infection, the inguinal or axillary glands were considerably enlarged. Inasmuch as the changes which take place in the glands, spleen, and other organs will be treated by Dr. Flexner, it will be unnecessary to describe these in this connection. I may add, however, that exceptionally well-marked pneumonia occasionally, though rarely, may be observed in guinea-pigs following subcutaneous injection. In one instance recently observed the pneumonic process was associated with pericarditis, the pus of which yielded a pure culture of plague bacilli.

The direct detection of the plague bacilli in the tissues of the six cases studied in San Francisco, the cultural properties of the organisms isolated from these cases and the successful animal inoculations demonstrated the existence of the plague in that city. If any additional proof as to the nature of these organisms and of the disease existing there were necessary it has been recently furnished by the accidental development of a case of acute pneumonic plague in one of the workers in the Hygienic Laboratory of the University of Michigan. The young man referred to had been engaged for some months in the preparation of Haffkine's vaccine and Lustig's serum.

A highly virulent California culture was employed in this work. In some unknown way, possibly through the use of a pipette or soiled finger, the organism was introduced into the mouth, and a very acute infection followed. The young man was taken sick on Wednesday evening, April 4th, and complained of intense backache. The temperature rose in a few hours to 102° and more. Toward morning he vomited twice a greenish, bile-stained fluid. At noon that day I learned for the first time of his illness, and with Dr. Vaughan visited him in the afternoon. When seen his temperature was 102.8° ; his eyes were bloodshot, and he complained of severe headache; the pulse was rapid, and the pulmonary distress was marked. It was clearly a very severe acute infection, and, knowing the kind of work he was engaged in, it was decided to give him at once an injection of Yersin's anti-pest serum. Twenty c.c. of this serum were given at 4 o'clock that afternoon. At the same time the tonsils and the inside of his mouth were rubbed with swabs, and the material thus obtained was planted on agar, and cover-glass preparations were also made. These showed a large number of ordinary mouth germs, but nothing that could be identified as plague bacilli. The cultures, it may be added, when developed were likewise negative, and when injected into a guinea-pig had no effect. At 8 o'clock in the evening the patient coughed up for the first time a small bit of blood-stained sputum. This was examined at once, and on staining showed plague bacilli. Accordingly the patient was removed immediately to the isolation hospital, and his room was locked up and thoroughly disinfected with formaldehyde.

After arrival at the isolation hospital, with the knowledge that we had to deal with a case of acute primary pneumonic plague known to be almost invariably fatal, intravenous injections were decided upon as offering the only possible chance for recovery. Accordingly 20 c.c were injected intravenously at about 11 o'clock that night. The next morning, the temperature still persisting at about 104°, a second intravenous injection of like amount was given. Even this showed no marked effect, and as the temperature reached 105.3° at one time, and the patient was becoming markedly apathetic, a third injection was made. This time 20 c.c. were injected intravenously and 40 c.c. subcutaneously. All told, he received within twenty-four hours after he was seen by us 120 c.c. of serum, one-half of which was injected intravenously. Within a few hours after the last injection the temperature dropped to 100°, and before the end of the third day of his illness it reached the normal. With the exception of an attack of heart failure caused by his attempt to sit up on the fourth day, and the serum effects, such as swollen joints and hives, which developed a week later, the patient made a complete recovery. Extreme cardiac weakness was a noticeable symptom, which persisted for more than two months after the onset of the disease.

It should be added that the animal experiment eventually confirmed the original microscopical diagnosis. A guinea-pig inoculated with the sputum raised at the end of the first day (Thursday evening) died in four days of typical plague. It is further noteworthy that a second guinea-pig inoculated with sputum rich in plague bacilli which was raised Saturday morning after the temperature had fallen remained alive.

APPENDIX.

Under this heading I have placed the description of the bacteriological work done on the six cases of plague which were studied in San Francisco by the commission. It should be stated that this matter forms part of the report of the commission as published in the *Public Health Reports* of the United States Marine Hospital Service.

CASE I.—Chun Ah Chou, 814 Washington Street; necropsy February 5th. The spleen and left femoral glands were examined. These organs were found to contain enormous numbers of bacilli having the morphological and tinctorial properties of bacillus pestis; thus the short, thick, oval rods gave a bipolar stain of the Löffler's methylene blue or with carbolic thionin and were decolorized by Gram's method. Their pathogenicity was determined by inoculation of portions of the spleen and of a pure culture, subcutaneously, into guinea-pigs.

Agar streaks made from the perfectly fresh organs showed many small white, moist isolated colonies, having all the appearance of those of bacillus pestis. This was further confirmed by microscopical examination of living and stained preparations of such cultures. A few rapid growing colonies due to other forms of bacteria were present. Subcultures were made in glucose gelatin, bouillon, agar, salt agar, and milk. On agar in Petri dishes in twenty-four to forty-eight hours in the incubator, small white or grayish, moist colonies developed. These had finely granular centres, with a smooth, sharply defined border.

The stab-culture in glucose gelatin developed a slight growth along the line of inoculation. On the surface the growth spread slightly, was grayish, moist in appearance, and had a slightly wavy, raised border. No gas was formed.

In bouillon, in twenty-four hours, a diffuse cloudiness was produced. The sediment was very slight, scarcely appreciable. Subsequently, a faint stringy deposit formed. The surface remained perfectly clear with a trace of a ring or collarette.

The streak cultures on nutrient agar presented a moderate grayish-white, moist growth which, when touched with a platinum wire, could be drawn out into strings.

On 5 per cent. salt agar the growth is very slight, scarcely visible, and shows the peculiar roundish or pyriform involution forms of the pest bacillus.

In milk the organism grows without producing any visible change in the medium.

The absence of gas production and of coagulation of milk, together with the macroscopical and microscopical characteristics, agreed fully with the properties of bacillus pestis. The effects on animals have been described in a preceding part of the report.

Guinea-pig No. 1.—Was inoculated under the skin with a portion of the spleen from the above case. It died in thirty-six to forty hours. Cultures on agar made from the spleen and heart's blood gave almost pure growths of the pest bacillus. Direct examination of the organs showed enormous numbers of typical plague bacilli.

Guinea-pig No. 2.—Was inoculated subcutaneously with a pure culture obtained from the gland of above case. The animal died in three days. Plague bacilli were very numerous in the spleen and inguinal glands, and were also present in the heart's blood.

CASE II.—Lum Hong Yuen, 28 Ross Alley; necropsy February 6th. Smear preparations from the spleen showed large numbers of short, thick rods, chiefly single; some oval or roundish forms were also present. The organisms stained readily with Löffler's methylene blue or with carbolic thionin. In the latter case the bipolar staining was excellent. The organisms were completely decolorized by Gram. Cover-glass preparations from the gland likewise showed very numerous bacilli, occurring singly, taking the bipolar stain, but not that of Gram. Agar cultures were made at the time of the necropsy in the undertaker's shop of Main Fook. The cultural and morphological characteristics were the same as those observed in Case I.

Guinea-pig No. 3.—Received subcutaneously a portion of the spleen from above case; died in five and one-half days. On autopsy the spleen was found markedly enlarged, full of white nodules which were also present in the liver and in the lungs. Cover-glass preparations from the spleen showed enormous numbers of bacilli, having all the characteristics of bacillus pestis. Agar slants were inoculated with the heart's blood and spleen of this animal. The former yielded a slightly contaminated growth, but the culture from the latter was pure.

CASE III.—Wong Chi Lui, 21½ Waverly Place; autopsy February 7th. Streaked preparations from the spleen showed very numerous pest bacilli apparently in pure culture; the predominating form was the short, thick rod, although some oval or roundish forms were present. Löffler's methylene blue and carbolic thionin stained the bacilli readily, demonstrating the characteristic bipolar form. The organisms were completely decolorized by Gram. Similar preparations made from one of the left femoral glands showed fewer organisms, but these in form, size, and staining reactions are identical with those found in the spleen. Cultures made on agar developed very slowly; on subsequent transplantation, however, the growth was more rapid, more abundant, and typical of that of bacillus pestis.

Guinea-pig No. 4.—Was inoculated subcutaneously with a portion of the gland from the above case. Death resulted in three and one-half days. Bacilli were numerous in the spleen and corresponded in characteristics to those of the plague bacilli.

Guinea-pig No. 5.—Was inoculated subcutaneously with a portion of the spleen; it was found dead three and one-half days later. Numerous plague bacilli were found in the spleen, heart's blood, and glands. Agar streaks from the heart's blood gave numerous small colonies of pest bacilli with a few larger colonies due to foreign organisms. The spleen gave numerous isolated small moist colonies, apparently a perfectly pure culture of the plague bacillus. Agar streak plates were made at the same time, and gave in twenty-four hours numerous minute colonies.

Guinea-pig No. 6.—A portion of the spleen from this case was introduced into the peritoneal cavity. Death resulted in four and one-half days. Pest bacilli were abundant in the internal organs and in the glands. Agar streaks from the heart's blood gave a very limited growth, while that from the spleen was scarcely visible. In this and several other instances difficulty was experienced in starting the growth of the organism directly from the tissues. Once started, however, with subsequent transplantations, better results were obtained.

Guinea-pig No. 7.—Was inoculated subcutaneously with a loopful of a pure culture obtained from Guinea-pig No. 5. It died in two and one-half days. Necropsy revealed a hemorrhagic œdema, and cover-glass preparations of this showed pest bacilli mixed with numerous minute diplococci and streptococci. The spleen was large and soft, contained nodules, and on staining cover-slips therefrom enormous numbers of typical plague bacilli, apparently perfectly pure, were found. No diplococci were present.

Case IV.—Tom Shom, 814 Washington Street; necropsy, February 11th. During life some fluid was aspirated by means of a sterile syringe from the swelling in the right femoral region and transferred to nutrient agar. Blood was also drawn from the lobe of the ear and planted on agar. Stained preparations made from these specimens failed to demonstrate the presence of any organism. Cultures developed pyogenic cocci, but failed to give any indication of pest bacilli. On necropsy, the femoral glands, though characteristic of plague, were found not markedly enlarged. It was evident that the aspirating needle, when introduced, had missed the gland proper, and the failure to isolate the pest bacillus during life in this case can thus be explained. It should be noted that the periglandular tissue was but very slightly involved. Streaked preparations made from the hemorrhagic gland showed relatively few typical plague bacilli. A long, thick bacillus was present in small numbers. Gram's stain was negative. Streaked preparations from the spleen showed the pest bacillus to be present in large numbers and apparently pure. The organisms occurred singly, gave the bipolar stain, and were decolorized by Gram.

Guinea-pig No. 8.—Was inoculated subcutaneously with a portion of the spleen from this case. Six and a half days later, though healthy in appearance, it was killed. A circumscribed caseous local lesion was found. There was a slight glandular enlargement on the same side. The spleen was slightly enlarged and showed white nodules. Pest bacilli having the short rod and oval form were present in small numbers.

Case V.—Ung Ah Buck, St. Louis Alley; necropsy, February 12th. Cover-slip preparations from the cervical glands showed the presence of several distinct organisms. The short, thick, oval forms of the pest bacillus were present in small numbers. With them was associated a large thick bacillus; there were also bacilli present resembling the bacillus diphtheriæ and a diplococcus closely resembling that of Fraenkel. The pest bacilli gave the usual bipolar stain with methylene blue and with carbolic thionin. Specimens stained by Gram's method showed deeply stained diplococci, the other forms being decolorized. Smear preparations from the spleen showed many organisms resembling the bacillus pestis morphologically.

Agar streaks from the fresh spleen gave a number of discrete moist colonies which consisted of large, oval, non-motile bacilli, occurring singly and only occasionally in pairs; the streak cultures from the cervical gland also gave numerous isolated colonies. In both cases the cultures obtained were apparently perfectly pure and agreed in every respect with those of plague bacilli. The other bacteria seen in cover-slips did not grow. Agar plates yielded the same results.

Guinea-pig No. 11.—Was inoculated subcutaneously with a small portion of the spleen from above case. In about three days the animal was very sick and was finally killed five and one-half days after inoculation. Bacillus pestis was found in the spleen and to a less extent in the blood.

CASE VI.—Foong Ah Fong, 747 Sacramento Street; necropsy, February 12th. Streaked preparations from the spleen revealed the presence of pest bacilli, although these were not very abundant; indeed, they were difficult to find in cover-slips. Typical bipolar staining rods and oval, roundish forms were, however, found. Gram's stain was negative.

Streak cultures were made with the fresh spleen on agar slants, and at the same time agar plates were made. The agar streaks failed to give an appreciable growth, but on the plate a colony was found which corresponded to that of the plague bacillus. On microscopical examination it was observed to consist of small, short, oval, non-motile rods, which decolorized by Gram. The colony transplanted to agar gave a typical growth of pest bacilli, and this culture was used to inoculate guinea-pig No. 10.

Guinea-pig No. 9.—Received a portion of the spleen of Foong Ah Fong subcutaneously. It died in four and one-half days. The spleen contained enormous numbers of pest bacilli, which stained in the usual bipolar manner and were decolorized by Gram. The heart's blood likewise contained the organism. Cultures were made on agar from the spleen and heart's blood of this animal; both gave numerous small, moist colonies of bacillus pestis.

Guinea-pig No. 10.—Was inoculated subcutaneously with the agar culture mentioned above. It was killed two and one-half days later. The spleen showed only a few but characteristic pest bacilli. Under the skin there was but slight local change and a few typical bacilli were found.

The bacteriological examination of the foregoing six cases has, therefore, demonstrated the presence of the bacillus pestis in each.

A CASE OF MALARIAL NEPHRITIS, WITH MASSING OF PARASITES IN THE KIDNEY.[1]

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THE frequent occurrence of renal lesions in malarial fever was described long before the discovery of the malarial parasite, and has been very constantly recognized throughout the progress of our knowledge of the disease.

Owing to the studies of Rempicci in Italy and of Thayer in America it is unnecessary to again review in detail the contributions of the various observers in this important field. On the evidence collected and largely contributed by these two writers one may now state with confidence that albuminuria is nearly constantly present in pernicious æstivo-autumnal infections and is frequently observed in the milder tertian cases. Of greater interest and importance are the rather numerous records of distinct signs of an acute exudative process in the kidneys, usually in æstivo-autumnal cases, less often in tertian infections, and consisting in the presence in the urine of epithelial and granular casts, many blood cells, as well as considerable albumin. Although the milder changes in the urine may develop, according to Rempicci, either during or shortly after the acute attack, it would seem that the more severe urinary signs can be safely attributed to the malarial infection only when arising in the course of a pronounced acute seizure.

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[1] Read before the Association of American Physicians, Washington, May 2, 1901.

Recovery has usually followed the acute symptoms, but Kelsch and Kiener, Laveran, Marchiafava and Bignami, Rempicci, and Thayer have described various types of chronic nephritis occurring in long-established or chronic cases of malaria, while Kelsch and Kiener state that the chronic nephritis of malaria is distinguished from other types by the prominence of hemorrhages and the comparative absence of fatty and hyaline degeneration and of arterial changes.

The acute nephritis of malaria is almost never immediately fatal, so that the pathologist must speak with reserve regarding the origin and significance of many of the cases of exudative nephritis commonly attributed to malaria. In view of the frequent clinical reports of the presence of considerable albumin, many casts, and of blood cells in the urine, and less often of œdema and mild uræmic signs in the disease, it seems certain that during severe malarial infection a true exudative nephritis is sometimes excited. Even in the absence of pathological examination of the kidneys these symptoms may with some confidence be referred to congestion of vessels, acute degeneration of cells, and exudation of serum and diapedesis of red cells from the bloodvessels, all dependent upon the action of the malarial toxin upon the renal tissue.

Coming, now, to the fatal cases of pernicious malaria in which there has been a microscopical examination of the kidney, the conditions found in this organ in all except hæmoglobinuric cases have been very uniform. The lesions observed have been those of a severe acute degeneration of the cortical tubule cells, with moderate exudation of albumin into the tubules and glomeruli.

The chief contributions in this field have come from Guarnieri, Marchiafava and Bignami, Monti, Bastianelli, Barker, and Benevenuti. In all of the reports of these observers the nephritis has been clearly of toxic origin, while the number of parasites found in the kidney has been small, although they were usually very numerous in other tissues. The single exception to this rule is found in one of Barker's cases, in which death and probably the recent changes in the kidneys were principally referable to general infection by streptococcus pyogenes Here the renal capillaries were frequently thrombosed by masses of streptococci and large numbers of tertian parasites. This case cannot, therefore, be regarded as one of malarial nephritis, but rather as an example of pyæmia or septicæmia terminating the usual benign course of a tertian malarial infection.

The invariable freedom of the kidney from localization of parasites in pernicious cases cannot be attributed to the phagocytic powers of this organ, which enjoys only a moderate capacity to destroy parasites. Guarnieri, who noted the small number of parasites in the kidneys of his and other cases, referred this comparative immunity to the rapid circulation of the organ.

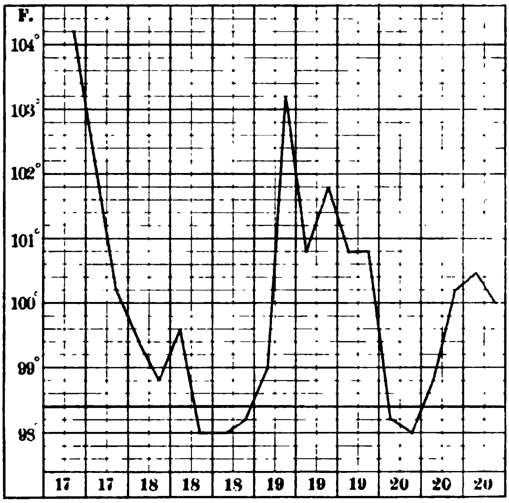
The examination of the records of microscopical examinations of the kidneys in malarial fever fully warrants the latest conclusions of Marchiafava and Bignami regarding the origin of the renal changes in pernicious malaria, which are as follows, quoting from their article in the *Twentieth Century Practice:*

"As to the pathogenesis of the renal lesions in malarial infections, we are at present able only to form theories. The knowledge of the parasite has so far thrown no light on the pathogenesis of the nephritis. In pernicious infections very few parasites are found in the kidneys even when the changes in the epithelium may be so grave as to lead to necrosis. From this fact we may infer that the lesions are due not to a localization of parasites in the renal capillaries, but to some toxic substance eliminated by the kidneys."

My own experience in the examination of fourteen fatal cases of malaria, seen mostly at Montauk in 1898, fully accorded with the above conclusion, as I found, usually, extensive degenerative changes in the kidney, once the lesions of hæmoglobinuric malaria, but comparatively few or no parasites in the renal vessels. The present case, recently encountered, developing in the vicinity of New York, showing the clinical symptoms of acute hemorrhagic nephritis, with partial suppression of urine, and giving clear microscopical evidence of extreme massing of parasites in the kidney, with various mechanical lesions resulting from their presence, seems to require a reversal of the above conclusion, and appears to show that malarial nephritis may be caused principally or in large part by the presence of an excessive number of parasites in the renal capillaries.

Clinical History. The patient was a friendless girl, aged seventeen years, a Slav, who had been in America one year. She had enjoyed good health until going as a servant to College Point, Long Island, in July, 1900. She was discharged early in September on account of an alleged "inability to work," and this fact, together with a distinct pallor and slight jaundice, noted on her return to the city, indicate that she had suffered for some weeks from malaria contracted on Long Island. On September 12th she was taken acutely ill, with chills and fever, and, being without the help of a physician, she became steadily worse until brought by an ambulance to the hospital, on September 17th.

On admission the patient was well nourished; tongue moist, slightly coated, prostration marked. Physical examination of lungs, heart, and liver was negative. The area of splenic dulness was enlarged, but the organ was not palpable. There was slight œdema of the legs. The urine, voided naturally in moderate quantity, was described as of high color, clear, acid in reaction; specific gravity, 1018; urea, two and one-half grains to the ounce; albumin, 2 per cent. by volume; sugar absent. Microscopically there were noted: epithelial cells, many red blood cells, and amorphous urates; diazo reaction marked. Temperature, 104.2°; pulse, 98. On September 18th there was vomiting of food and medicines; constipation relieved by enemas; and retention of urine with marked diminution in its quantity, which continued until death. Delirium developed on September 19th, and was controlled by morphine, sulphonal, and choralamid, given at intervals, on the 19th and 20th. On the 19th she vomited a round worm and was given at intervals three doses of santonin, three, five, and fifteen grains, without any change being noted in the urine, stools, or conjunctiva. Delirium continued on the 20th, and, the pulse failing steadily, she became comatose and died at 9 P.M. The four-hourly temperature-chart is appended. The clinical diagnosis was typhoid fever, with acute nephritis.



Autopsy, by Dr. Otto Schultze, thirteen hours after death. Body well nourished; rigor well marked. *Heart* normal. An ounce of straw-colored fluid in pericardium. A few ecchymoses in visceral pericardium. *Lungs:* Few old pleural adhesions. A few ecchymoses in visceral pleura. *Liver* appeared normal. *Pancreas* normal. *Stomach* normal. *Ileum* congested, solitary follicles moderately swollen. *Colon* congested. *Spleen* much enlarged. Weight, sixteen ounces; consistence firm; Malpighian bodies prominent; pulp dark red. *Kidneys* together weighed sixteen ounces; consistence reduced; capsule free; cortex remarkably light in color; medulla and papillæ extremely dark, and slightly rust-colored; cortical markings entirely obscured. In the cortex of the right kidney there is a superficial anæmic infarct with surrounding hemorrhagic zone. This infarct measures 3½ x 2 cm. in area, and 2 mm. in depth.

Anatomical Diagnosis. Acute hemorrhagic nephritis. There was still no suspicion of malarial infection. Cultures of liver, spleen, and kidney yielded bacillus coli and putrefactive species.

Through a misunderstanding, all the viscera, except the kidneys, were thrown away. The kidneys were hardened in 5 per cent. formalin and examined microscopically.

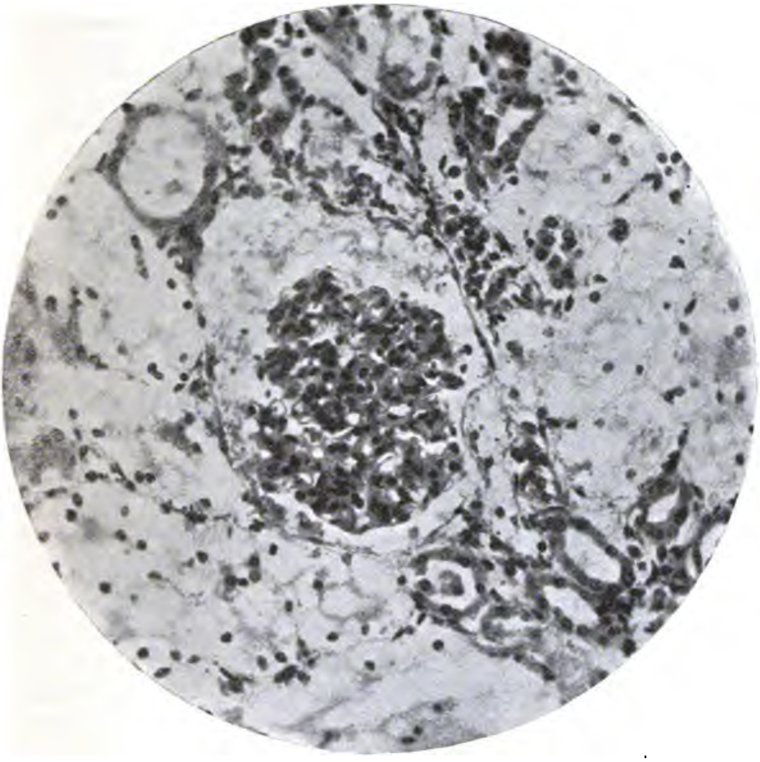
Microscopical Examination of Kidneys. After the malarial infection was suspected, on account of the peculiar pigmentation of the glomeruli and straight vessels, thin sections cut in celloidin and paraffin were stained most successfully by Nocht's method, as employed for blood smears. This was the only method by which I could secure a blue color in the bodies of parasites lying in red cells stained deeply by eosin. For this purpose sections remained in the dye for twenty-four hours, and were then slightly decolorized in alcohol, and cleared in oil of cajuput. The chromatin, however, was not stained. The changes demonstrated by this and other methods were of a most remarkable type.

The lining cells of the convoluted tubules were almost entirely destroyed, not by erosion, but by extreme swelling and degeneration, apparently of hydropic type. (Fig. 1.)

These tubules were thereby distended and uniformly filled by an indiscriminate mass of vacuolated cell detritus in which pyknotic nuclei were irregularly scattered. All the cortical tubules were about uniformly affected. The glomeruli contained a moderate number of pigmented cells and a few parasites within the capillaries, while the capsules were distended by granular coagulum. The small cortical vessels were almost invariably collapsed, and to this perfectly bloodless condition must be ascribed the whitish color visible in the gross. Occasionally a capillary was found distended with a mass of pigmented parasites.

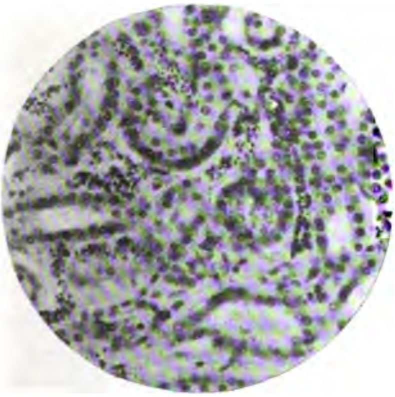
In the medulla the lining cells of all tubules were markedly eroded. In this region most of the capillaries were filled, and many were distended with masses of infected red cells and pigmented parasites which had nearly destroyed the red cells. (Fig. 2.) Many of the distended capillaries were ruptured, and the tissue was studded with miliary hemorrhages, about some of which a few leucocytes, mostly mononuclear, were gathered. The parasites were of small and very uniform size, but richly pigmented. They were identical in appearance with the full-grown forms of the æstivo-autumnal parasites seen in sections of tissue of other cases in which these parasites were identified in the blood during life. Very few rings or rosettes could be discovered, so that the brood was unusually compact. (Fig. 3.) Their numbers and compact massing were similar to what I have seen in other fatal cases in which the parasites were massed in the brain, heart muscle, or bone-marrow. The discharging tubules were distended with casts, usually coarsely granular, sometimes entangling infected red cells and pigmented leucocytes. Some infected red cells lay free in the lowest discharging tubules.

FIG. 1.



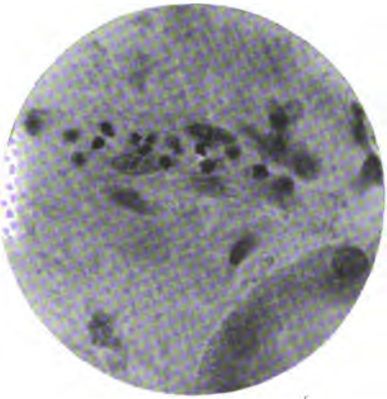
Convoluted tubules and Malpighian body. × 250.

FIG. 2.



Malarial parasites in kidney. × 250.

FIG. 3.



Parasites in renal capillary. × 1000.

The infarcted area in the right kidney was in an early stage of coagulation necrosis. All the capillaries about this area and many within it were distended with blood cells, most of which contained parasites and pigment. Many of the vessels leading to this area were distended to two or three times their natural calibre by thrombi of infected red cells. The infarction is clearly referable to the plugging of small vessels, mostly capillaries, by thrombi of infected red cells. The number of parasites in this cortical zone and throughout this section of the medulla was greater than I have ever seen in any other tissue.

The following *summary* presents the lesions observed in the kidneys: Extreme and peculiar degeneration of lining cells of all cortical tubules. Distention of capsules of glomeruli by granular albuminous coagulum. Occlusion of most cortical capillaries by the distended tubules. Large superficial red and white infarction, from occlusion of vessels by thrombi of infected red cells. Numerous miliary hemorrhages, from rupture of distended capillaries. Distention of nearly all capillaries in medulla and papillæ by infected red cells and parasites. Casts in discharging tubules, consisting usually of coarsely granular material, but sometimes entangling infected red cells and pigmented leucocytes.

EPICRITICAL. The following questions arise concerning the significance of the above findings:

1. Is it possible to draw any conclusions regarding the significance of the renal lesions on account of the failure to examine the other viscera microscopically?

2. Is the present case a true example of massing of æstivo-autumnal parasites in the kidney comparable to the cases in which they have been found massed in the brain in comatose cases, in the gastro-intestinal tract in choleraic cases, in the heart muscle in cardiac cases, or in the marrow as observed in a case of pernicious anæmia?

3. What is the origin of the extreme degeneration of the cortical tubules?

1. To the first question there can be no hesitation in answering that the renal lesions are in themselves sufficiently distinct to stand as the chief feature of the case. Doubtless there were many parasites in the other viscera, but where pigmented parasites are extensively massed in any tissue gross evidence of their presence may be detected in the excessive pigmentation and extreme blood content of that tissue. No such evidence being present in the gross appearance of any other viscus, it is safe to conclude not only that the kidney contained an excessive proportion of parasites, but that they were not excessively numerous in any other locality. The clinical features of the case also support this belief.

2. It is equally clear that the case is one of true malarial nephritis in which a peculiar hemorrhagic character of the lesion is referable to the mechanical effects of massing of parasites in the renal tissue. This lesion is not to be classed with the usual type of renal lesion in malaria, which is an acute degeneration referable to the general toxæmia of the

disease, and in which comparatively few parasites have heretofore been found in the kidney. Enormous numbers of parasites in the capillaries, thrombosis of many vessels, and multiple hemorrhages are the specific lesions observed when the parasites have been massed in the brain, gastro-intestinal tract, heart muscle, and marrow.

3. The extreme degeneration of the cortical tubules seems also to be a somewhat peculiar feature of the present case. In the reported cases of malarial nephritis of purely toxic origin the degeneration of tubule cells has often been extreme, but it has always been of a different type from that described above. In fourteen cases which I have examined the degenerative changes have always been much less advanced and of a different type from those of the present case. Although much of the change in the tubule cells was doubtless owing to the general toxæmia of the disease, I am inclined to refer the peculiar character of the process and its extreme degree to the presence of so many parasites in the tissues acting principally through obstruction of the circulation.

Finally, it is important to consider the possibilities of diagnosis during life of this type of malarial nephritis. From the clinical examination of the urine and the microscopical appearance of the discharging tubules in the kidney it seems probable that a diagnosis of this type of malarial nephritis may be established during life on the following evidence, to be obtained from the urine. Partial or complete suppression of urine; considerable admixture of intact red cells; a considerable proportion of albumin; the presence of many coarsely granular, epithelial, and some blood casts; the presence of *infected red cells*, both free and adherent to casts, and of pigmented leucocytes adherent to casts.

The present case, while demonstrating the existence of a specific type of malarial nephritis, yields no new indication why the æstivo-autumnal parasite selects certain viscera for its chief attack, and demonstrates no new character in the pathogenic action of this protozoon.

There is no known reason why the bronchopulmonary mucosa, or that of the colon, or the serous membranes, or the skeletal muscles, should not suffer in the same way as do the brain, the gastro-intestinal mucosa, the heart muscle, and the marrow. The kidney may be specially exempt on account of its rapid circulation, as suggested by Guarnieri, but apparently it does not always escape. The actively phagocytic viscera, the liver, and spleen, seem capable of rapidly destroying the enormous influx of parasites which frequently reaches their capillary systems. Yet the lymphoid marrow, with its more complex circulation, is known to be less resistant than the spleen and lymph nodes.

These two factors, however—rapid arterial circulation and active phagocytic powers—seem to be the only qualities which can preserve a tissue from occasional overwhelming growth of the æstivo-autumnal parasite.

Microscopical examination of the kidneys of fatal cases of malaria has, then, yielded evidence of three main types of acute renal lesions occurring in this disease.

1. Acute degeneration of toxic origin, often reaching a degree in which exudation of blood serum into the tubules is added. This lesion is responsible for the vast majority of the cases of albuminuria in malaria.
2. An extreme form of acute degeneration, with focal necroses, numerous hemorrhages, and exudation into the tubules of blood serum and blood pigments. This lesion is seen in cases of hæmoglobinuric malarial fever, and it has not yet been found associated with an excessive number of parasites in the capillary vessels.
3. Massing of parasites in the renal capillaries, with extreme degeneration of parenchyma cells, multiple hemorrhages, and exudation of blood serum into the tubules. It seems certain that this type of lesion can occur only in severe æstivo-autumnal infections.

There is anatomical evidence that in the pernicious æstivo-autumnal cases the three types of lesions may be variously combined, but no good reason for believing that with the benign tertian infection occurring in this latitude any other than the first type can exist.

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INFLUENZA AS A CAUSAL FACTOR IN ACUTE MASTOIDITIS AND THE EARLY TREATMENT.[1]

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The importance of the relation of influenza or la grippe to acute mastoiditis has been fully demonstrated, to my satisfaction at least, by the number of cases coming under observation within the past few years. Reviewing the literature of acute mastoiditis, one is impressed with the fact that the large majority of cases are associated with or immediately follow epidemics of influenza. To be clearly understood, I will state in the beginning that it is accepted that mastoid complication following influenza is consequent upon tympanic infection; therefore, in all of these cases we have to deal with a tympano-mastoiditis. I am convinced that the mastoid antrum at least is involved in most, if not all, grippal infections of the middle ear; the further extension would seem to depend upon the character and virulence of the infection, and possibly upon its association with other infection, the age of the patient, and our proper estimate of the early treatment. Influenza is defined as an infectious disease due to Pfeiffer's bacillus, and characterized by inflammatory symptoms of the respiratory tract, digestive and nervous systems, accompanied by prostration and a marked tendency to complications. The conditions found in the upper respiratory tract concern us most, on account of the direct bearing upon our subject. The phenomena found here are irregular; in some the mucous membrane is thickened, irritated, and swollen; pain and discomfort complained of, out of all proportion to the appearances; in other cases we find a more intense congestion of the mucous membrane, less swelling, and a tendency to the formation of small blood clots here and there over the surface. I speak of these to call attention to the fact that the writer in his experience has found practically the same peculiar differences in middle-ear complications following grippal infection, and which we think have a direct bearing upon the character of the mastoid involvement. It has been my good fortune to see, in the last three epidemics of influenza, a large number of cases of complicating otitis media and mastoiditis, and I have been forced to the conclusion that there is a great difference in these two varieties of infection. The former is apt to come on during convalescence or following the attack; the patient complains of an uncomfortable feeling in the ear, gradually changing to severe pain in from twelve to twenty-four hours. Examination usually reveals the membrana tympani moderately congested, no decided bulging, and, to all appearances, a mild case of otitis media. From this time on the character of the case changes; there is developed mastoid tenderness on deep pressure, or the slightest suspicion over the tip, or it may be absent entirely. Bulging of the membrana flaccida becomes very pronounced, and the pain excruciating. There is in these cases an almost simultaneous invasion of the tympanum, antrum, and cells with the infectious and suppurative process, and their integrity is rapidly encroached upon. After incision of the membrana tympani, regardless of the thoroughness with which it is done, there is a continued copious purulent discharge. The amount and rapidity of pus formation is astounding. The incision fails to take on a reparative process, the lips remain open, pouting, and, in some, necrotic, the whole picture giving one the impression of a very active suppurative process in tissue of low vitality. *I have seen very few of this type of cases escape an active and rapid involvement of the mastoid.* The latter variety we find coming on more often during the attack; the patient complains of sudden severe pain in one ear, followed, it may be in two or three days, by the same in the other. There may be a slight blood-tinged serous discharge and some mastoid tenderness. Examination in these cases gives us an entirely different picture; the membrana tympani is intensely congested, with small hemorrhagic areas over its surface, which appear to be between the layers of the membrane, giving it the appearance of marked bulging. I have seen this hemorrhagic condition extending well along the cutaneous covering of the bony canal. These cases, while to all appearances they would indicate a much more severe condition, in the writer's experience have yielded more readily to conservative measures of treatment. Influenza, as a causal factor in tympano-mastoiditis, is being recognized, and its importance given much consideration by some of our best observers. Kyle, in a paper read before the Southern Section of this Society last December, is very explicit on this point. He says: "This infection has a curious way of affecting and penetrating certain tissues, cavities, and locations of the mucous membranes which is peculiar to itself. I have seen following the attack of la grippe, or associated with it in most rapid succession, an involvement of the middle ear, this involvement being of an infectious nature and rapidly going on to suppuration. I have seen both middle ears involved, with associated involvement of both mastoids, the involvement being rapid and virulently infectious." Knapp says: "The grippe is a frequent cause of mastoid caries," and reports a number of cases in support of his views.

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[1] Read before the Eastern Section of the Laryngological, Rhinological, and Otological Society, at Buffalo, N. Y., June 21 and 22, 1901.

A point of great importance to be kept in mind in dealing with this particular infection is the great rapidity of its progress and its usually virulent nature. The writer called attention to this fact in a paper read before the Jefferson County Medical Society, July, 1900, and published in the *Laryngoscope*, February, 1901. I can do no better than quote my words at that time: "There is great necessity of a thorough examination in all cases of suppurative middle-ear disease with a view of determining the extent of the process, and especially so in cases complicating influenza, as I have come to look upon this particular infection with greater anxiety regarding the dangerous complications than any other we have to deal with. When once beyond the tympanic cavity its virulence is shown by rapid destruction of the mastoid walls, and if not relieved by surgical interference it is apt to involve the meninges and brain in a purulent inflammation."

In my humble opinion I believe la grippe infection is responsible for more cases of acute suppurative mastoiditis than either scarlatina, measles, or diphtheria. My clinical experience bears me out fully in this statement. The results of Perez, in his recent experiments with Pfeiffer's bacillus to determine the influence of virulent cultures upon traumatism, do not agree with clinical experience. He made a number of inoculations—150 injections in all—into the different cavities and organs of the body, and in all obtained equally unsatisfactory results. The peritoneal and pleural cavities, brain, eye, ear, and joints were all successively injected. But five cases of purulent otitis occurred after twenty injections of the middle ear. From his results the author expresses the belief that Pfeiffer's bacillus does not cause infection, but an intoxication, and its pathogenicity is due to a toxin. This may explain the difference in the different varieties of tympano-mastoiditis referred to above; it may be that in one we have an inflammation due to the inoculation of the Pfeiffer bacillus alone, whereas in the other variety it may be associated with a pyogenic organism, and the virulence of each thereby increased. The rapidity of the invasion and destructive process would indicate some such combination of influence. Although a great deal has been said and written in the past few years on the early or abortive treatment of acute mastoiditis, it would seem to me that from the number of different views and different methods employed there is still ground for discussion. I have used the Leiter ice-coil or ice-bag advised by McKernon; heat externally and hot douching, advocated by Roosa; leeching, as recommended by Bacon, with rest, cathartics, etc., and found each has its advantages in certain selected cases. I would strongly emphasize the fact that in the early treatment of these cases we should not expect to take any one method and apply it indiscriminately to every case of acute tympano-mastoiditis that comes under our observation any more than we would take one method and apply it in any other class of cases. Great care should be exercised in selecting our cases for this or that method of treatment, for much depends upon good judgment in the early stage. This fact alone, I think, will explain in a measure the great discrepancy in the results obtained by different observers when using the same line of treatment. If we see these cases early and can separate them into the types which I have endeavored to make clear much can be done in an abortive way. My best results have been obtained in what I will term the hemorrhagic type, by rest in bed, free catharsis, leeching in front of the tragus and over the mastoid, and hot douching of the canal every two hours. I do not here incise the membrane. The writer is well aware that this method of hot douching has been severely criticised, and it is said the tissues macerate, making perforation more liable; but in my hands this has not been the case, and I have found that it has given me the largest percentage of recoveries. These are the cases wherein I feel we are justified in applying abortive measures. It is my impression that in this variety of acute otitis we have the same condition of the mucous membrane of the antrum and possibly the cells that we find in the tympanum. Whether my impression be true or erroneous, a considerable number of these cases recover under abortive treatment, be it ice-bag, heat, or leeching.

In the other variety, or that of grippal infection with suppuration, the writer is equally radical, as he would appear conservative in the hemorrhagic variety. From the fact that suppurative influenza otitis almost always runs an acute course up to the inception of the dangerous complications, and being convinced that the antrum is early invaded by the suppurative process and, in rapid succession, the mastoid cells, I do not feel justified in prolonging conservative treatment. Early and free incision of the drum membrane, warm douching every two hours for cleansing purposes, rest, and catharsis, constitute my early treatment. In my experience if this does not yield palpable results in thirty-six to forty-eight hours the case will be one for surgical interference. To prolong conservative measures is to jeopardize the welfare of our patient. The writer is convinced that it is not a wise plan to apply the ice-coil in any case where the mastoid is involved in a purulent inflammation, from the fact that it will mask the symptoms and lead us astray in estimating the extent of the process, and before it is realized our patient is beyond the border-line of safety. I think each one of us, in operating early on acute cases, must have been surprised to find the amount of destruction which had taken place in so short a time. I have seen the entire mastoid in a purulent and necrotic condition, with involvement of the facial nerve and complete facial paralysis, in one week from the first ear symptoms. It is generally agreed that a pyogenic disease of the mastoid is a dangerous condition ; therefore, if we feel satisfied that such exists it is, I believe, our duty to immediately open the mastoid cells and not try to palliate or abort an already dangerous condition. In those cases where we are in doubt and where conservative treatment has proved inefficient, it would seem that an exploratory operation, spoken of by Dench at our recent annual meeting, would be justifiable. The operation, *per se*, is practically devoid of danger in the hands of an ordinarily skilful operator, and aside from the cosmetic effect I can see no valid objection to it.

In conclusion, I wish to emphasize the fact that in influenza we get two distinct types of tympano-mastoiditis: First, the suppurative, which invades the tympanum, antrum, and cells almost simultaneously in an unusually virulent and destructive process, which calls for early surgical treatment and in which abortive measures are contraindicated. Second, the hemorrhagic, with very pronounced symptoms at first, but which yields readily to abortive measures, and, in the writer's experience, only about 5 per cent. go on to suppuration requiring radical interference.

A METHOD FOR THE DIFFERENTIAL MODIFICATION OF THE PROTEIDS IN PERCENTAGE MILK MIXTURES.

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In a monograph on "The Scientific Modification of Milk," recently published (*International Clinics*, October, 1900), the writer has given numerous formulæ for calculating the proportions of the various milk-derived fluids required in making percentage mixtures. These include combinations of cream and whole milk, cream and separated (fat-free) milk, gravity cream and its separated (under) milk, cream and whey, and simple cream dilutions.

In all these combinations, except indirectly in the all-cream-and-whey mixtures, the total proteids alone are considered in working out the modified proteid percentage, and thus the relative proportions of lactalbumin and caseinogen that are found in the basal milk and cream are not susceptible of variation in these ordinarily employed modifications. In the cream and whey mixtures, which are made by diluting creams of various fat percentage with pure whey, the proportion of lactalbumin is considerably increased as compared with that obtained in the other milk combinations containing the same total proteid percentage; but until recently no means of obtaining definite percentages of lactalbumin and caseinogen has been devised.

A preliminary note upon such a method was communicated by the writer to the Philadelphia Pediatric Society at its meeting in October, 1900. About the same time the problem was undertaken by the Walker-Gordon Laboratory Company, following the experimental work of Franklin W. White and Maynard Ladd, of Boston, who have given a partial exposition of the subject in a valuable paper of recent date (*Philadelphia Medical Journal*, February 2, 1901). In this communication the possibilities of the method are touched upon, but no definite rules for its practical application are suggested. The object of the present paper, therefore, is to describe a simple method for obtaining definite percentages of lactalbumin and caseinogen in combination with definite fat and sugar percentages.

One of the great difficulties in artificial feeding with ordinary milk and cream mixtures lies in the large proportion of caseinogen that must be given to the infant in order to provide a sufficiently rich proportion of the proteid elements. The writer has elsewhere shown[1] that satisfactory nutrition in a child, aged three or four months, cannot be expected from a mixture containing less than 1.50 per cent. of combined proteids, and by a simple calculation it can readily be proven that in the ordinary milk and cream dilutions containing this percentage of proteids, fully 1.20 per cent. consists of caseinogen, just about twice as much as is found in human milk, to say nothing of physical differences in this body as it exists in cow's milk, which render it much less readily digestible by the human suckling than is human caseinogen.

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[1] "The Scientific Modification of Milk," International Clinics, October, 1900, p. 266.

Again, the analysis of human milk proteids shows an average percentage of only 0.59 caseinogen with fully 1.23 lactalbumin (Koenig), while cow's milk contains at least 2.48 per cent. caseinogen with only 0.66 per cent. lactalbumin (Van Slyke). This large excess of lactalbumin over caseinogen in human milk naturally suggests that the former proteid body is much more important for the needs of the growing infant than is the caseinogen, which forms less than one-third the total proteid percentage. It is, therefore, evident that if the analysis of mother's milk is to be used as a standard for the composition of milk mixtures for the artificial feeding of young infants, account must be taken of this wide divergence in the proportions of the two principal proteid bodies in the cow's milk.

Any dilution of cow's milk that brings the caseinogen percentage down to a figure corresponding with that found in human milk (0.59), say one part of milk to four parts of water, reduces at the same time the lactalbumin percentage of the mixture to something like 0.13, about one-tenth of the amount found in the human breast secretion. If, then, lactalbumin must be considered an important element of the breast milk proteids, such a reduction of its percentage in an artificial mixture constitutes a grave defect in the ordinary methods of modification based simply upon a reduction of the total proteid percentage.

Even in a mixture in which the total proteids are made about 1.50 per cent. the percentage of lactalbumin would be only 0.30, a proportion which is still but a fourth of the normal lactalbumin percentage of mother's milk, while, as has already been shown, the caseinogen percentage is still twice as large as the normal.

It is quite possible that in certain cases in which breast milk produces indigestion in the nursing infant some change in the relative proportion of caseinogen may be at fault, and may constitute one of the alterations to which we rather vaguely apply the term "disturbance of equilibrium." If it were possible definitely to modify this percentage for the individual case maternal feeding might be kept up when otherwise it becomes necessary to wean the infant from what in other respects appears to be a desirable maternal supply. This, it must be confessed, is a purely theoretical suggestion upon which no definite analytical investigation has been carried out, but it serves to emphasize the importance of greater flexibility than has been previously afforded for the delicate manipulation of the proteid percentages in artificial feeding, with which at present we are exclusively concerned.

It is thus made manifest that a simple cream, milk, and water mixture, in which total proteids alone are considered, does not fulfil the demand for wider latitude in a regulation of caseinogen and lactalbumin percentages, and that another milk-derived fluid is needed to permit of increase in the deficient lactalbumin percentage, just as cream serves to raise the unduly low percentage of fat resulting from dilution. Such a fluid is whey, which contains fully 1.00 per cent. of proteids other than caseinogen, the latter having been removed from the milk in the process of whey preparation. Whey has always occupied a place in infant diet, but its possibilities have as yet attracted little attention in modern methods of feeding, except in the writings of Kehrer and very recently in those of Monti.[1] Its proteids consist almost entirely of lactalbumin, with a very small proportion of lactoglobulin, and perhaps other soluble proteids in minute quantities. These bodies collectively have been termed the whey-proteids by White and Ladd (*loc. cit.*). The term, however, is rather awkward, and, since lactalbumin forms almost the entire proteid content of the whey, it seems best to speak of the whey-proteids specifically as lactalbumin, and as such the term will be hereafter used.

There is thus presented the problem of combining cream, milk, whey, sugar of milk and a diluent in such proportions as to furnish definite percentages of fat, caseinogen, lactalbumin, and sugar within the limits of practical possibility.

The keynote of such a modification is to be found in the ratio existing in cow's milk between the normal percentages of caseinogen and lactalbumin. According to Koenig's well-known analyses, which give 2.88 per cent. caseinogen to 0.53 lactalbumin, this ratio is seen to be nearly 5½ to 1. White and Ladd (*loc. cit.*) have essayed to establish a new ratio between caseinogen and whey-proteids obtained from the milk of the Walker-Gordon Laboratory of Boston, and in several analyses found that the total proteids averaged 3.84 per cent., of which 0.90 per cent. was whey-proteids and 2.94 per cent. caseinogen. This average of analysis, it will be observed, gives the percentage of total proteids of whole milk considerably higher than that usually obtained, with a percentage of whey-proteids far beyond that of any other analysis with which the writer is familiar in the literature. It is also noteworthy that the percentage of total proteids in the Boston milk is considerably higher than that obtained by Leffmann in Walker-Gordon milk from the Plainsboro dairy, the percentage of which for nine months has averaged about 3.3 (statistics Pediatric Society Milk Commission). The ratio between caseinogen and whey-proteids thus deduced by White and Ladd is therefore about 3 to 1; and it is to be presumed that upon this ratio the laboratory has based the calculations for its so-called whey-cream modifications, which, according to these investigators, are made from 32 per cent. cream, fat-free milk, fat-free whey, and a very concentrated solution of milk sugar.

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[1] Archiv f. Kinderheilk., Bd. xxxi., Heft 1 und 2.

An examination of the literature shows that in 1893 Van Slyke (*Journal of the American Chemical Society*, November, 1893, p. 605) reached the following conclusion: That in analyses of whole milk the caseinogen has varied from 1.93 to 3, and averages 2.48; that the albumin has varied from 0.55 to 0.86, and has averaged 0.66 per cent. This percentage for the lactalbumin also agrees very closely with that given by Blyth (*Foods: Composition and Analysis*, second edition, p. 208), who asserts that the albumin is quite fairly constant and averages 0.70. Van Slyke states that milk rarely contains five parts of casein to one of albumin, and not often does the ratio go above 4½ to 1, and seldom goes below 3 to 1, while the average is somewhat under four parts to one. This proportion also agrees very closely with the estimation previously made by Leeds.

We have thus a rather varied estimation of this important ratio, ranging from Koenig's 5½ to 1, to Van Slyke's and Leeds' 4 to 1, down, finally, to White and Ladd's 3 to 1. Since White and Ladd's ratio of 3 to 1 is based upon what they speak of as "several analyses" only, it would seem more satisfactory for the present to use Van Slyke's average ratio of 4 to 1, which is based upon a considerable number of analyses of milk from American dairies.

A feature of decided interest brought out by White and Ladd's study is the fact that whey contains about 1.00 per cent. proteids, which is slightly higher than Koenig's estimate of 0.86 per cent. This higher figure, too, agrees with analyses published by the United States Department of Agriculture, which, as the mean of a large number of analyses of whey, gave a whey-proteid percentage of 1.00. White and Ladd have suggested that the whey should be made from fat-free milk, and they have thus obtained a fluid containing no fat with 1.00 per cent. of lactalbumin and about 4.8 per cent. sugar. This suggestion is of special value since, in the first place, it decidedly simplifies the somewhat tedious calculations necessitated by the use of a whey containing a small percentage of fat, and, in the second place, it makes for economy in permitting the use of fat-free milk, which in a way is a waste-product of the dairy, and can be obtained from the laboratory at a very moderate cost.

The modification which is now to be described is made from cream (usually 16 per cent., sometimes 20 per cent., and very rarely 32 per cent.), whole milk, fat-free whey, and a diluent, or from various combinations of two or three of these fluids, to which is to be added the amount of sugar in dry form required to bring up the sugar percentage, and, if desired, lime-water to produce the necessary alkalinity. It is quite evident that when all three milk-fluids are combined the fat of the finished mixture will be supplied by the cream and the milk, the caseinogen by the cream and the milk, and the lactalbumin by the cream, by the milk, and, usually in greatest part, by the whey. Sugar is contributed by all three of these milk-fluids, and by the added sugar of milk.

It will be observed that the milk and the cream supply all the caseinogen and a portion of the lactalbumin. The proportion of lactalbumin thus supplied must bear the normal ratio to the amount of caseinogen, or, in other words, the milk and cream supply the desired caseinogen percentage plus a portion of the desired lactalbumin percentage equal to one-fourth of the caseinogen percentage. The balance of the lactalbumin percentage, if any remain to be added, will therefore be furnished by the whey. The practical problem thus becomes quite a simple one.

Calculation of Formulæ. The following symbols will be used in the calculations:

F = the desired fat percentage.
K = “ caseinogen per ct.
A = “ lactalbumin “
S = “ sugar “

C = quantity of cream in ounces.
M = “ milk “
Wh = “ whey “
L = “ dry sugar of milk in ounces.
W = “ diluent “
Q = “ total mixture “

To these are to be added two intermediate values:

P′ = percentage of combined proteids supplied by milk and cream.
A′ = “ of lactalbumin supplied by whey.

The first step is to derive values for P′ and A′. These are readily found, since we know that the milk and cream furnish all the caseinogen percentage plus a part of the lactalbumin percentage equal to one-fourth of the caseinogen percentage; and the percentage of lactalbumin to be furnished by the whey is what remains after deducting from the total desired lactalbumin percentage the percentage already supplied by the milk and cream. We thus find:

$$P' = K + \tfrac{1}{4} K \tag{1}$$

$$A' = A - \tfrac{1}{4} K \tag{2}$$

Having found the value of A′, the quantity of whey is very simply calculated by the proportion A′ : 1.00 : : Wh : Q, whence the equation:

$$Wh = \frac{A'}{1.00} \times Q = A' \times Q \tag{3}$$

The quantities of milk and cream are next found by substituting P′ for P in the regular formulæ :[1]

$$(4) \qquad C = \frac{(F - P')Q}{12.4 \text{ or } 16.8 \text{ or } 29.2}$$

$$(5) \qquad M = \frac{Q \times F}{4} - 4 \text{ or } 5 \text{ or } 8 \times C$$

The quantity of diluent will be found by subtracting from the total quantity of mixture the combined sum of the quantities of cream, milk, and whey, thus :

$$(6) \qquad W = Q - (C + M + Wh)$$

The formula for sugar gives the amount of dry sugar of milk in ounces to be added :

$$(7) \qquad L = \frac{Q \times S - (4\,C + 4.4\,M + 4.8\,Wh)}{100}$$

For the sake of simplicity this formula may be expressed with sufficient accuracy :

$$L = \frac{Q \times S - 4.4\,(C + M + Wh)}{100}$$

In the modifications suggested by White and Ladd a 32 per cent. cream is used in combination with a separated (fat-free) milk. This is quite feasible in the laboratory, but for home modification so rich a cream cannot easily be obtained, and is generally unnecessary when whole milk instead of separated milk is used in combination with it. For the ordinary combinations a 16 per cent. cream will be found sufficiently rich. It is only when the milk formula (5) works out a negative value that a higher fat cream is required, and for the majority of such formulæ a 20 per cent. cream will be found rich enough.

If, however, it is desired to make the modification with fat-free milk instead of whole milk, formulæ (4) and (5) become :[2]

$$(4') \qquad C = \frac{Q \times F}{16 \text{ or } 20 \text{ or } 32}$$

$$(5') \qquad M = \frac{Q \times P' - (3.6 \text{ or } 3.2 \text{ or } 2.8)\,C}{4}$$

In these formulæ, 16 and 3.6, or 20 and 3.2, or 32 and 2.8 are to be taken as 16, 20, or 32 per cent. cream is used.

One or two examples will show how readily these calculations can be made.

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[1] For an explanation of the derivation of formulæ (4), (5), and (7), the reader is referred to the author's monograph on the subject (International Clinics, November, 1900, p. 233). When 16 per cent. cream is used the divisor in (4) is 12.4, and the coefficient of C in (5) is 4. When 20 per cent. cream is required 16.8 and 5 respectively are to be used; and with 32 per cent. cream 29.2 and 8 are similarly to be chosen.

[2] International Clinics, November, 1900, p. 256.

Example I. Required the proportions of whole milk, 16 per cent. cream, whey, and sugar to give a modified formula containing fat, 3.50; caseinogen, 0.80; lactalbumin, 0.50, and sugar, 6.00 in a total mixture of forty ounces.

Here (1) becomes

$$P' = 0.80 + 0.20 = 1.00$$

and (2)

$$A' = 0.50 - 0.20 = 0.30$$

Therefore, we obtain at once from (3)

$$Wh = 0.30 \times 40 = 12 \text{ oz.}$$

By substituting in (4) the value obtained for P′ we get

$$C = \frac{(3.50 - 1.00)\,40}{12.4} = 8 \text{ oz.},$$

and, therefore,

$$M = \frac{3.50 \times 40}{4} - 4 \times 8 = 35 - 32 = 3 \text{ oz.}$$

The quantity of diluent is found by substituting these values in (6):

$$W = 40 - (8 + 3 + 12) = 17 \text{ oz.}$$

The quantity of dry sugar of milk to be dissolved in the diluent before combining the ingredients is found by substituting in (7):

$$L = \frac{40 \times 6 - (4 \times 8 + 4.4 \times 3 + 4.8 \times 12)}{100} = \frac{240 - 102.8}{100} = 1\tfrac{3}{8} \text{ oz.}$$

The modification would, therefore, be made after the following recipe:

Cream 16 per cent.)	8 oz.
Milk	3 "
Whey	12 "
Diluent	17 "
Dry sugar of milk	1⅜ "

If desired, lime-water may be added to produce an alkaline reaction in the proportion of 5 to 10 per cent. of the mixture. Thus two to four ounces of the diluent may be replaced by an equal quantity of lime-water.

If separated milk were used in place of whole milk we should have from (4′) and (5′):

$$C = \frac{40 \times 3.50}{16} = 8\tfrac{3}{4} \text{ oz.}$$

$$M = \frac{40 - 31.5}{4} = 2\tfrac{1}{8} \text{ oz.}$$

The quantity of whey would remain the same as in the previous example, since the value of A′ would not be affected by variations in the values of C and M.

Example II. Required the proportions of 16 per cent. cream, whole milk, whey, and sugar to give a modified formula of forty ounces containing fat, 3.00 ; caseinogen, 0.40 ; lactalbumin, 0.75 ; sugar, 6.50.

Here, as before, we obtain :

$$P' = 0.40 + 0.10 = 0.50$$

$$A' = 0.75 - 0.10 = 0.65$$

Therefore,

$$Wh = 0.65 \times 40 = 26 \text{ oz.}$$

$$C = \frac{(3 - 0.50)\,40}{12.4} = 8 \text{ oz.}$$

$$M = \frac{3 \times 40}{4} - 4 \times 8 = -2 \text{ oz.}$$

This result shows that a 16 per cent. cream contains too low a proportion of fat, and, therefore, a higher-fat cream must be used. A 20 per cent. cream will serve the purpose, and thus using 16.8 as a divisor in (4) and 5 instead of 4 as a coefficient of C in (5) we obtain :

$$Wh = 0.65 \times 40 = 26 \text{ oz.}$$

$$C = \frac{(3 - 0.50)40}{16.8} = 6 \text{ oz.}$$

$$M = \frac{3 \times 40}{4} - 5 \times 6 = 0.$$

$$L = \frac{40 \times 6.50 - 4 \times 6}{100} = 2\tfrac{3}{8} \text{ oz.}$$

and

$$W = 40 - (26 + 6) = 8 \text{ oz.}$$

Practical Limitations of this Modification. It is quite evident that in any mixture containing whey the percentage of lactalbumin could not exceed 1.00, and could never quite reach this figure, since cream or milk added to the mixture to supply fat would have the effect of diluting the whey and thus reducing the lactalbumin percentage below 1.00. This loss could not be entirely made good by the added milk or cream, since the lactalbumin percentage of milk or cream is only one-fifth of its total proteids.

It is therefore important to determine the limits within which caseinogen and lactalbumin percentages may be modified. In the first place, the lowest possible percentage of lactalbumin will be obtained when A' is equal to 0, which is seen to be the case when $A = \frac{1}{4} K$. It is also evident that the lowest possible caseinogen percentage will be obtained when the ratio between fat and caseinogen is such as to require only cream and no milk in the modification. By taking a value for P' in terms of K from (1), we obtain :

$$(8) \qquad P' = \frac{5K}{4}$$

This value of P′ may now be substituted for P in a formula representing the relation between P and F in a mixture containing 16 per cent. cream and no milk:[1]

$$P = 0.225\,F, \tag{9}$$

and we obtain

$$\frac{5K}{4} = 0.225\,F,$$

or

$$5K = 0.90\,F;$$

and

$$K = 0.18\,F; \tag{10}$$

and therefore

$$A = 0.045\,F. \tag{11}$$

It thus becomes evident that the lowest possible percentages of caseinogen and lactalbumin are conditioned by the percentage of fat desired. For example, when the fat percentage is 3.00 the lowest caseinogen percentage will be $0.18 \times 3 = 0.54$, and the lowest lactalbumin percentage will be $0.045 \times 3 = 0.135$. Such a formula should work out as a simple cream dilution, without milk or whey; thus, for forty ounces:

$$P' = 0.54 + 0.135 = 0.675$$

$$A' = 0.135 - 0.135 = 0.$$

$$Wh = 0 \times 40 = 0.$$

$$C = \frac{(3 - 0.675)\,40}{12.4} = 7\tfrac{1}{2}\text{ oz.}$$

$$M = \frac{40 \times 3}{4} - 4 \times 7\tfrac{1}{2} = 0.$$

If a 20 per cent. cream be used we may substitute the value of P′ from equation (8) in the formula expressing the relation between F and P in 20 per cent. cream dilutions:[2]

$$P = 0.16\,F; \tag{12}$$

and we obtain

$$\frac{5K}{4} = 0.16\,F,$$

$$5K = 0.64\,F,$$

and

$$K = 0.128\,F; \tag{13}$$

and therefore

$$A = 0.032\,F. \tag{14}$$

Thus, for 3 per cent. fat the lowest possible caseinogen percentage from 20 per cent. cream is $0.128 \times 3 = 0.384$, and the lowest lactalbumin percentage is $0.032 \times 3 = 0.096$.

In like manner, for 32 per cent. cream the minimal values for K and A for any percentage of fat are found to be:

$$K = 0.07\,F, \tag{15}$$

$$A = 0.0175\,F; \tag{16}$$

and thus for 3 per cent. of fat the minimum caseinogen percentage is 0.21 and the minimum lactalbumin percentage is 0.0525.

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[1] For derivation of formulæ (9), (12), and (15), the reader is referred to the author's monograph, p. 258.

[2] Ibid.

Starting from such minimum percentages of caseinogen and lactalbumin in simple cream dilutions, increasing values may be obtained as milk and whey are added to the mixture.

The maximum value for caseinogen would be reached when both forms of proteid were furnished by milk without additional cream, the quantity of milk, and consequently the caseinogen percentage, being conditioned as before by the fat percentage. This would obtain when the value of C in formula (4) becomes 0, which requires that

$$F = P'.$$

By substituting here the value of P' from (8) we obtain:

$$F = \frac{5\,K}{4},$$

or

$$K = 0.80\ F. \qquad (17)$$

This signifies that for any fat percentage the maximum caseinogen percentage is four-fifths as great; thus for 3 per cent. fat the maximum caseinogen percentage is 2.40.

The maximum lactalbumin percentage that may be combined with a maximum caseinogen percentage for any definite fat percentage will be obtained when whey without additional water forms the diluent, the total percentage of caseinogen being furnished by whole milk. This condition is expressed by the equation:

$$Wh = A'Q = Q - M.$$

Referring to formula (6) it will be seen that when C is 0 the equation for milk becomes:

$$M = \frac{QF}{4}.$$

This value for M, substituted above, gives:

$$A'Q = Q - \frac{QF}{4},$$ whence by dividing out Q,

$$A' = 1 - \frac{F}{4};$$ and by substituting the value of

A' from (2)

$$A - \frac{K}{4} = 1 - \frac{F}{4},$$

or

$$A = 1 - \frac{F}{4} + \frac{K}{4}, \qquad (18)$$

which expresses the maximum value of A for any value of F which determines a maximum value for K. If the value of K in terms of F, as derived from (17), be substituted, we obtain finally:

$$A = 1 - \frac{F}{4} + \frac{F}{5} = 1 - 0.05\ F. \qquad (19)$$

Thus under the conditions of the problem it is evident that the maximum value for the lactalbumin percentage when F is 1.00 and K is a maximum is 0.95; when F is 2.00, it is 0.90; when F is 3.00, it is 0.85, and when F is 4.00, it is 0.80.

It is quite obvious that when K is less than a maximum for any definite fat percentage the lactalbumin percentage may be slightly higher than the figures just given, since a somewhat larger amount of whey could be used to make up for the decrease in the quantity of milk and cream required to give a lower than a maximum caseinogen percentage. The maximum limit of the lactalbumin percentage under these conditions will be attained when all the diluent is whey, which thus is equal to $Q - (M + C)$.

By a similar but considerably more complicated calculation than that by which (19) is derived, we can finally deduce for 16 per cent. cream and whole milk mixtures:

$$A = 1 - 0.0524\ K - 0.008\ F; \tag{20}$$

for 20 per cent. cream,

$$A = 1 - 0.0476\ K - 0.012\ F; \tag{21}$$

and for 32 per cent. cream,

$$A = 1 - 0.0496\ K - 0.010\ F, \tag{22}$$

each of which expresses, for the strength of cream used the maximum value for the lactalbumin percentage for any definite fat and caseinogen percentage. The results obtained by working out these values of A for definite fat values when minimal values for K are used, show that the possible maximal lactalbumin percentage can be increased above that possible for maximal caseinogen values by quantities varying from 0.03 at the lower end of the scale to 0.11 at the upper limit. This, of course, is only possible when there is no watery diluent. Since, however, a small quantity of water is useful in dissolving the additional sugar of milk, which does not dissolve readily in the milky fluids, it is preferable to restrict the lactalbumin percentages to something less than those that can be obtained theoretically. For practical purposes the figures given in the last column of the following table, which are only possible with the minimum caseinogen percentages, may be slightly reduced to those given in the third column as obtainable with maximum caseinogen percentages, and these latter can always be obtained with any caseinogen percentage between the minimum and maximum values. Thus, for 3 per cent. of fat, lactalbumin percentages between 0.06 and 0.85 may be obtained with any possible caseinogen percentage, the limits of which are given in the second column of the table (0.21 to 2.40), provided, always, that the desired lactalbumin percentage shall not fall below one-fourth of the caseinogen percentage.

TABLE SHOWING THE MAXIMUM AND MINIMUM VALUES OF PERCENTAGES OF CASEINOGEN AND LACTALBUMIN OBTAINABLE WITH ANY DEFINITE FAT PERCENTAGE.

Fat percentage.	Range of possible caseinogen percentages.		Range of possible lactalbumin percentages.		Maximum lactalbumin percentage for minimum caseinogen percentage.
1.00 . . .	0.18 (16 per ct.)	to 0.80	0.045 (16 per ct.)	to 0.95	0.98
	0.128 (20 ")		0.032 (20 ")		0.98
	0.07 (32 ")		0.0175 (32 ")		0.98
1.25 . . .	0.225 (16 ")	to 1.00	0.056 (16 ")	to 0.93	0.97
	0.16 (20 ")		0.040 (20 ")		0.97
	0.0875 (32 ")		0.0218 (32 ")		0.98
1.50 . . .	0.27 (16 ")	to 1.20	0.0675 (16 ")	to 0.92	0.97
	0.192 (20 ")		0.048 (20 ")		0.97
	0.105 (32 ")		0.0262 (32 ")		0.97
1.75 . . .	0.315 (16 ")	to 1.40	0.0787 (16 ")	to 0.91	0.96
	0.224 (20 ")		0.056 (20 ")		0.96
	0.1225 (32 ")		0.0306 (32 ")		0.97
2.00 . . .	0.36 (16 ")	to 1.60	0.09 (16 ")	to 0.90	0.96
	0.256 (20 ")		0.064 (20 ")		0.96
	0.140 (32 ")		0.035 (32 ")		0.97
2.25 . . .	0.405 (16 ")	to 1.80	0.10125(16 ")	to 0.88	0.96
	0.288 (20 ")		0.072 (20 ")		0.95
	0.1575 (32 ")		0.039 (32 ")		0.96
2.50 . . .	0.45 (16 ")	to 2.00	0.1125 (16 ")	to 0.87	0.95
	0.32 (20 ")		0.080 (20 ")		0.95
	0.175 (32 ")		0.04375(32 ")		0.96
2.75 . . .	0.495 (16 ")	to 2.20	0.12375(16 ")	to 0.86	0.95
	0.352 (20 ")		0.088 (20 ")		0.95
	0.1925 (32 ")		0.04812(32 ")		0.96
3.00 . . .	0.54 (16 ")	to 2.40	0.135 (16 ")	to 0.85	0.94
	0.384 (20 ")		0.096 (20 ")		0.94
	0.21 (32 ")		0.0525 (32 ")		0.95
3.25 . . .	0.585 (16 ")	to 2.60	0.14625(16 ")	to 0.83	0.94
	0.416 (20 ")		0.104 (20 ")		0.94
	0.2275 (32 ")		0.05687(32 ")		0.95
3.50 . . .	0.63 (16 ")	to 2.80	0.1575 (16 ")	to 0.82	0.93
	0.448 (20 ")		0.112 (20 ")		0.94
	0.245 (32 ")		0.06125(32 ")		0.95
3.75 . . .	0.675 (16 ")	to 3.00	0.16875(16 ")	to 0.81	0.93
	0.480 (20 ")		0.120 (20 ")		0.93
	0.2625 (32 ")		0.06565(32 ")		0.94
4.00 . . .	0.72 (16 ")	to 3.20	0.18 (16 ")	to 0.80	0.93
	0.512 (20 ")		0.128 (20 ")		0.92
	0.28 (32 ")		0.07 (32 ")		0.94

A glance at this table will show the limits within which differential modification of proteids is possible. For example, a mixture containing 2.50 fat, 1.00 caseinogen, and 0.50 lactalbumin can be worked out by the formulæ already given, but the same combination of fat and caseinogen with only 0.20 lactalbumin could not be obtained, since the lactalbumin is less than one-fourth of the caseinogen. If 0.25 lactalbumin be chosen, the problem becomes a possible one.

From the various hypotheses just made in working out maximum and minimum values it appears that these mixtures may consist of simple cream dilutions; cream, milk, and water; cream, whey, and water; milk and water; milk, whey, and water; cream and whey; milk and whey; cream, milk, and whey; and cream, milk, whey, and water, any one of which may be required according to the relative percentages of fat, caseinogen, and lactalbumin demanded in the modification. The use of separated (fat-free) milk is also possible in certain cases in combination with cream, with cream and whey, or with cream, whey, and water.

Reasoning conversely, it becomes evident that any of these various combinations of the milk fluids must contain definite percentages of fat, caseinogen, lactalbumin, and sugar; and it is possible to accurately estimate in any mixture of known proportions of these fluids just what the various percentages are. The following formulæ are necessary:

$$(23)\quad \text{For fat percentage}\ \left\{\begin{array}{ll} \frac{C}{Q}\times(16 \text{ or } 20 \text{ or } 32)^{*} & = \text{fat percentage from cream.}\\[6pt] \frac{M}{Q}\times 4 & = \text{fat percentage from milk.}\end{array}\right.$$

Sum of these = fat percentage in modification.

$$(24)\quad \begin{array}{c}\text{For caseinogen}\\ \text{percentage}\end{array}\ \left\{\begin{array}{l} \frac{C}{Q}\times(3.6 \text{ or } 3.2 \text{ or } 2.8)^{*}\times\frac{4}{5} = \text{caseinogen per ct. from cream.}\\[6pt] \frac{M}{Q}\times 4\times\frac{4}{5} = \text{caseinogen percentage from milk.}\end{array}\right.$$

Sum of these = caseinogen percentage in modification.

$$(25)\quad \begin{array}{c}\text{For lactalbumin}\\ \text{percentage}\end{array}\ \left\{\begin{array}{l} \frac{C}{Q}\times(3.6 \text{ or } 3.2 \text{ or } 2.8)^{*}\times\frac{1}{5} = \text{lactalbumin per ct. from cream.}\\[6pt] \frac{M}{Q}\times 4\times\frac{1}{5} = \text{lactalbumin percentage from milk.}\\[6pt] \frac{Wh}{Q}\times 1 = \text{lactalbumin percentage from whey.}\end{array}\right.$$

Sum of these = lactalbumin percentage in modification.

A similar calculation would give the sugar percentage of the modification without taking into account the added sugar, or, if this latter be desired, a formula may be derived from (7) by transposition:

$$(26)\qquad S = \frac{100\,L + 4\,C + 4.4\,M + 4.8\,Wh}{Q}$$

This method of modification, therefore, covers the whole range of modified milk mixtures, and effects a definite modification of fat, caseinogen, lactalbumin, and sugar within possible limits—a very decided advance over any method that hitherto has been proposed either in laboratory or in home modification.

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* One or other of these factors is to be taken as 16 per cent., 20 per cent., or 32 per cent. cream is used, 16 and 3.6, 20 and 3.2, or 32 and 2.8, respectively, being required.

Practical Application of these Modifications. In practice the use of mixtures prepared under this system of modification has yielded the most gratifying results, especially with cream and whey, or milk and whey, or cream, whey, and water, or cream, milk, whey, and water combinations. In the most difficult cases, in which very low percentages of caseinogen are at first required, these combinations may be used in a sort of progressive series, beginning with a cream, whey, and water, or a cream and pure whey mixture. Then by a gradual increase of the caseinogen percentage secured by adding successive small quantities of milk, while the whey or water is decreased equally so as to preserve a constant total quantity of the mixture, the combination becomes one of cream, milk, and whey, or cream, milk, whey, and water; and if the decrease is confined to the whey alone, or if at the time the milk is increased the water is also increased while the whey alone is decreased, we after a time reach a point when the quantity of whey becomes so small, say six to eight ounces, that it may be omitted altogether, its bulk being supplied by the same quantity of water. Thus the mixture becomes a simple cream, milk, and water modification, from which, by continued increase of milk, decrease of water, and, after the fat percentage reaches 4.00, by appropriate decrease of the cream, we finally reach whole milk.

To put this in a concrete example, let us suppose by aid of the table we begin with a formula of fat, 2.00; caseinogen, 0.36; lactalbumin, 0.50 (total proteids, 0.86), and sugar, 5.00. This should require cream, whey, and water, the quantities of which for a forty-ounce mixture will be found to be cream (16 per cent.) five ounces; whey, sixteen and two-fifth ounces; water, eighteen and three-fifth ounces, and sugar of milk, one ounce. If this mixture is found to be well digested an effort may be made to increase the caseinogen percentage. This may be done in one of two ways: either a new formula may be calculated, say for 0.40 per cent. caseinogen, the other percentages being left as before, or a more complex change may be made by adding a small quantity of milk, which will slightly increase not only the caseinogen percentage, but also those of the fat, lactalbumin, and sugar. In general, an increase in all the percentages is desirable, especially when the initial formula has been made low in all its percentages. In the example the addition of a half-ounce of milk, with the decrease of a half-ounce in the quantity of water, will be found to add 0.05 per cent. to the fat, 0.04 per cent. to the caseinogen, 0.055 per cent. to the sugar, and 0.01 per cent. to the lactalbumin. The new mixture will, therefore, contain cream, five ounces; milk, one-half ounce; whey, sixteen and two-fifth ounces; water, eighteen and one-tenth ounces, and sugar of milk, one ounce, and its percentage equivalent will become: F 2.05; K 0.40; A 0.51, and S 5.055.

Of the two plans the latter is much to be preferred, since it permits frequent changes to be made without a recalculation of the quantities, and thus the mother can be given general instructions and can continue to increase the percentages of the formula without constant supervision. Suppose in this way she has gradually added milk and decreased water until her working formula stands: cream, five ounces; milk, ten ounces; whey, sixteen and two-fifth ounces; water, eight and three-fifth ounces, and sugar of milk, one ounce. By means of formulæ (23), (24), and (25) it can be readily calculated that the percentage formula has now become: F 3.00; K 1.16; A 0.70 (total proteids, 1.86), and S 6.10—a very nutritious mixture differing little from that of a good average breast milk, except in the relative proportions of caseinogen and lactalbumin. A closer imitation could be made, if desired, by reducing the percentage of caseinogen and increasing that of lactalbumin, say caseinogen 0.96 and lactalbumin 0.90, which a glance at the table shows to be a possible combination.

In the formula as it now stands (F 3.00; K 1.16; A 0.70, and S 6.10) the lactalbumin percentage contributed by the whey—0.41—is rather too important to be sacrificed at this point, since the total proteid percentage without it would fall to 1.45, and we shall, therefore, continue for a time to increase the milk and decrease the water; or, if it is desirable as quickly as possible to get rid of the necessity of preparing whey, the water may be kept at eight and three-fifth ounces, and the whey alone may be decreased step by step with the increase of the milk.

By this plan the quantity of whey will be decreased while the lactalbumin percentage suffers little change, as can be shown: the increase of an ounce of milk will add 0.10 per cent. to the total proteids (or 0.08 to the caseinogen and 0.02 to the lactalbumin), while the decrease of an ounce in the quantity of whey will take away only 0.025 from the lactalbumin, and thus the total lactalbumin percentage will be scarcely disturbed. Under this plan the addition of eight ounces of milk, with an equal decrease of whey, will add 0.80 per cent. to the total proteids, or 0.64 per cent. caseinogen, and 0.16 per cent. lactalbumin; while the decrease of eight ounces of whey will subtract 0.20 per cent. lactalbumin, leaving the total lactalbumin at 0.66 per cent., only 0.04 below the previous formula. At this point the remaining eight and two-fifth ounces of whey, which contribute only 0.21 per cent. lactalbumin, may be omitted, its bulk being replaced by simple diluent. We have thus reached by gradual steps a cream, milk, and water modification of the ordinary kind, consisting of cream, five ounces; milk, eighteen ounces; water, seventeen ounces, and sugar, one ounce, containing these percentages: F 3.80; K 1.80; A 0.45 (total proteids, 2.25); and S about 5.00, the withdrawal of the whey, which is rich in sugar, having decreased the sugar percentage from 6.10. If so desired this percentage may be increased by the addition of a quantity of sugar of milk to be determined by formula (7).

Starting, now, from the cream, milk, and water combination, containing cream, five ounces; milk, eighteen ounces, and water, seventeen ounces, the milk may be gradually increased until two ounces more are added to the milk and two ounces taken from the water. At this point the fat percentage becomes 4.00, which is as high as it is generally desirable to have it. Subsequent increase of the milk may be associated with a decrease of the cream, one drachm of 16 per cent. cream being omitted for each half-ounce of milk added, or one drachm of 20 per cent. cream for five drachms of milk. By this device the fat is kept at about 4 per cent., while the proteid percentage goes on increasing until, when finally the quantity of milk reaches forty ounces, the cream and water have been replaced entirely by milk and the mixture becomes unmodified whole milk.

This example shows one of many possible methods of varying the relative proportions of caseinogen and lactalbumin in feeding a single case. If evidences of casein indigestion should appear in the stools the caseinogen percentage may be decreased, while the fat and lactalbumin percentages are varied according to indications. For example, by reference to the table, it will be seen that for 2 per cent. fat a caseinogen percentage as low as 0.14 may be obtained by using a 32 per cent. cream, and that even with a 16 per cent. cream the caseinogen percentage may be kept as low as 0.36. With this latter very low caseinogen percentage any lactalbumin percentage from 0.09 up to 0.96 per cent. may be obtained, a resulting total of 1.32 per cent. of mixed proteids for the maximum lactalbumin percentage. With a higher percentage of fat, say 3.00, the caseinogen percentage may still be kept as low as 0.21 if a 32 per cent. cream be used; and even with a 16 per cent. cream the percentage need not be higher than 0.54.

In the severer cases of chronic gastric catarrh it will usually be found by observation that a low percentage of fat gives better results than a medium or high percentage (2.50 to 4.00), and in such cases a combination of milk and whey at first may be much better borne by the stomach than a cream and whey, or a cream, milk, and whey mixture. In such a modification the fat percentage and the caseinogen percentage are nearly equal, the latter being four-fifths of the former, as is indicated by formula (17); and, as larger quantities of milk are added, this same ratio of fat to caseinogen is maintained, the percentages being kept under control by means of formulæ (23) and (24). After a time the fat may be increased more rapidly, if desired, by calculating out the quantities for any chosen percentage combination by means of the regular formulæ (1), (2), (3), (4), and (5).

Partial Predigestion. While digestive equilibrium can be secured by a sufficient reduction in the percentages of the proteids and fat, it must not be overlooked that an artificial mixture containing less than 1.50 proteids does not furnish what has been shown to be a satisfactory living ration for any but the youngest infant. It is true that life can be supported indefinitely upon a mixture containing a proteid percentage something more than 1.00, but, with this, satisfactory gain in weight and fibre cannot be expected after the first few weeks of life. A percentage of 1.50 for the proteids must, therefore, be secured just as soon as the infant's digestive powers will permit of it, and to this end partial predigestion of the mixture will give material aid. For example, an infant of four weeks who failed to digest satisfactorily a mixture containing 2.88 fat and 0.63 total proteids was enabled by partial peptonization perfectly to assimilate a mixture in which the total proteids were raised to 1.00. Such a gain in the proportion of proteids that can be assimilated fully justifies the resort to this expedient. In the more difficult cases partial predigestion of the cream and milk is often a very valuable help. Here the cream and milk, together with a portion of the diluent about equal in quantity to that of the cream and milk combined, may be partially predigested for eight, ten, twelve, or fifteen minutes at a temperature of 105° F., after which the mixture is rapidly raised to a temperature of 150° F. to check further action of the pancreatin, and then cooled before the addition of the whey. Or, the whey may be added to the warm milk and cream mixture after peptonization has been carried on for five to seven minutes, and the process then continued for five to eight minutes longer, after which rapid heating to 150°.

Preparation of the Mixtures. There is no question that the best and most accurate results are obtainable when the ingredients of the mixture are prepared and combined in the laboratory. If for various reasons this is impracticable, perfectly satisfactory results may be secured by home modification in the hands of an intelligent mother with materials supplied by the laboratory.

Even in the absence of laboratory help very satisfactory results can be obtained by applying these principles of computation to the best materials that come to hand. While there will be divergences between the actual and theoretical percentages in the resulting mixture, the same flexibility of variation will be afforded, and relative increase and decrease in the initial percentages can always be effected, according to the demands of the case. The most important prerequisite is a cream of fairly constant fat percentage. This being given, the proteid percentages may be reckoned on the theoretical basis with comparative accuracy.

For most of the modifications that will be used under these conditions two quart jars of whole milk a day will be sufficient, one to supply the cream and the separated milk for making the whey, the other to supply the whole milk and to make up any deficiencies in the quantities of cream and whey obtained from the first bottle. Many specimens of bottled milk show a considerable rise of cream even when first delivered, and a few hours of standing in ice or ice and salt will add considerably to the separation, which can be clearly seen at the top of the bottle. By means of a glass siphon the lower separated milk may be drawn off and kept for making the whey, while the upper creamy layer will be left in the bottle to be used as the cream. Whey made from this separated milk, while not entirely free from fat, will contain only a very minute percentage of it.

The cream remaining in the bottle should be thoroughly stirred to obtain uniformity of composition, and samples of this should be taken for several days and analyzed for the fat percentage, an average of which should be taken for the fat percentage of the cream to be used in the modification. If this be impracticable it will be safe to assume for the purposes of calculation that it averages 16 per cent. After all, in any given case the actual percentage of fat in the mixture is not so important as the relative changes that may be made. If the infant can digest a certain proportion of fat, it does not matter whether it actually be 2.00 per cent. or 2.25 per cent. A relative increase or decrease of 0.25 per cent., for instance, would raise or lower either percentage by about the same amount, and effect the desired change for this particular baby. The only disadvantage in dealing with uncertainties in the actual percentages of the component milk fluids of a mixture is that the physician cannot so sharply crystallize his experience in percentage feeding as to gain an accurate estimate of the significance of definite percentages as applied to digestive capacities.

In preparing the whey the separated milk is warmed to a temperature of 100° F., and essence of pepsin, liquid rennet, or a junket tablet added to it. About two teaspoonfuls of essence of pepsin to the pint are required, while liquid rennet, according to White and Ladd, is active in the proportion of one drachm to two quarts. The junket tablet is a cheap, convenient, and very efficient means of precipitating the curd, and has been generally preferred by mothers who have tried all three agents.

The milk is kept at 100° F. until coagulation takes place, and it is then put aside in the refrigerator to favor contraction of the curd and exudation of the whey. At the end of half an hour the solid curd is to be cut into small cubes, put into a freshly-boiled cheese-cloth bag of double thickness, and allowed to drain simply by gravity, since squeezing forces some of the curd through the meshes of the bag. After the whey is thoroughly drained it should be heated to a temperature of 150° F. in order to destroy the rennin, and again cooled before being finally mixed with the other fluids.[1] When partial predigestion of the milk and cream has been effected this heating of the whey is not necessary, unless it be desired for its Pasteurizing action. Otherwise, in combination with raw milk the excess of rennin in the whey would cause precipitation of fresh curd.

All that now remains is to mix the cream, whey, and whole milk with the diluent in which the milk sugar has been previously dissolved, divide the mixture into bottles each containing the amount for one feeding, and put away in the refrigerator.

In conclusion, it may be stated that differential modification of the proteids is not offered as a panacea for all the difficulties of infant feeding. In some cases even with the most carefully thought-out combinations disappointment must be expected. In a very few cases the addition of whey to the mixture in any proportion has seemed to produce pain and indigestion. That such infants became comfortable under the use of a 1 in 32 dilution of condensed milk probably indicates that the power of digesting proteids was very weak, since this dilution of condensed milk contains only about 0.26 per cent. of proteids, a proportion considerably below any of the total percentages tried in the differential modifications. It is evident, therefore, that in some cases whey does not seem to be well borne. These few failures, however, in a rather extensive experience up to the present time, simply serve as the exceptions that prove the general rule.

In a large number of other infants, of from four to five months or older, most of whom suffered from serious catarrhal disease, the result of previous faulty methods of feeding, whey has been perfectly borne, and has yielded results which seemed impossible under other forms of feeding. In not a few of these cases whey has formed the almost exclusive means of supplying proteids in mixtures consisting of cream and all whey. In all these cases the improvement of nutrition under whey modifications has been striking and comparable only to that to be sometimes attained by resort to the breast milk of a perfectly satisfactory wet-nurse.

After all, the last word upon infant feeding still remains to be written; but it is confidently claimed that differential modification has brought us several steps nearer to the hoped-for goal. Further study of its remarkable possibilities may yet explain and correct the few failures that occasionally occur.

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[1] This temperature, 150° F., is lower than the writer has elsewhere recommended (170° F.), but according to White and Ladd's experiments, the lower temperature is sufficient to destroy the rennin and does not injure the whey by coagulating a portion of its lactalbumin, a change which begins, as Hammarsten has shown, at a temperature somewhat below 170° F.

REVIEWS.

A MEDICO-LEGAL MANUAL. By WILLIAM W. KEYSOR.
Burkley Printing Co., Omaha, 1901.

As the scope of medical science widens and the list of accessory subjects more or less closely allied to medicine proper lengthens, the small manual becomes almost a necessity to the general practitioner who realizes that he is expected to have at least a speaking acquaintance with all the various specialties. While this applies more particularly to specialties in the commonly accepted sense of the word, and the subject of medical jurisprudence is really an integral part of general medicine, it is nevertheless true that this important study is apt to be too much neglected by the student during his academic course. Hence, he is confronted at the very outset of his professional career, before even he has left the sheltering walls of the hospital—his second alma mater—with problems which because of their purely practical or civic nature have never obtruded themselves on his too theoretical mind. When suddenly called upon to give testimony, for instance, it is a comfort to learn from a friendly legal brother just what, in the opinion of an intelligent jury, one is expected to know, and above all to have observed and remembered in any given case.

There is a constant danger of taking too one-sided a view of topics belonging chiefly to one's own particular work, forgetting that these same topics may in an equal degree interest the members of an allied profession, not to speak of the general public, who, however, approach the subject from a somewhat different direction. Mr. Keysor's book is for this reason most suggestive; it is written by a lawyer for a doctor, and while not intended for a complete text-book of *medico-legal science*, as the author prefers to call his subject, presents in a condensed form the information necessary for a physician to possess. The arrangement of subjects is excellent, the style easy and quite free from objectionable technicalities. Much information of a purely practical kind is interwoven with an able exposition of general principles and definitions which sufficiently attest the author's sincere appreciation of the philosophical and moral sides of his subject. The chapter on opinion evidence, while not altogether palatable reading for a doctor, well deserves a careful perusal. The abuses in this field have long occupied the columns of the laic press and form no inconsiderable part of the stock in trade of the professional joke-maker. The author's remarks, if true—and he seems an eminently fair-minded man—show a deplorable state of things in this respect.

While the book is intended principally for the use of those practising in Nebraska, the differences between the laws of that State and those of other States are indicated with sufficient freedom to make the book a useful addition to any doctor's library. R. M. G.

A TREATISE ON APPENDICITIS. By GEORGE RYERSON FOWLER, M.D., Professor of Surgery in the New York Polyclinic; Surgeon to the Methodist Episcopal Hospital; Surgeon-in-Chief to the Brooklyn Hospital, etc. Second edition, revised and enlarged. Pp. 235; 58 illustrations; 13 plates, 5 colored. Octavo. Cloth. Philadelphia: J. B. Lippincott Co.

THE first edition of Fowler's *Appendicitis*, consisting of a revised reprint of a series of articles which appeared in the *Annals of Surgery*, undoubtedly contributed largely to the pioneer work then being accomplished in this disease. "Much of the book has been rewritten, several chapters recast, and two new chapters added," one on the differential diagnosis, and one on the medical treatment of appendicitis. The work is well printed on excellent paper and beautifully illustrated. Unfortunately the author clothes his thoughts so liberally with words that one easily loses sight of the idea or fact presented and sees only the verbal great-coat which hides it.

Although it is fashionable to believe that almost every pathological condition is due to microbic infection we are glad to observe that Fowler maintains bacteria do not necessarily play a part in all cases of subacute and chronic relapsing appendicitis. He suggests, from a clinical and microscopical study, that, in many of these cases, vascular and nervous lesions in the mesoappendix precede and produce the changes in the appendix, and that angulation or the pressure of an overfilled colon may lead to an active or passive hyperæmia of the organ. He considers traumatism and indigestion (enteritis?) scarcely possible as etiological factors. We have had the opportunity to observe several patients who attributed their appendiceal trouble to external injury, and Small (*Medical Record*, September 10, 1898) reports thirteen cases of appendicitis with a clear history of trauma. The instances of appendicitis preceded by digestive trouble appear to us to be quite numerous.

We find in the twenty-two pages devoted to differential diagnosis the same fault already mentioned, the essential facts are obscured by "clouds of words and lakes of ink." For instance, a table detailing the differential points between appendicitis and tubo-ovarian inflammation is given, then a paragraph each on ectopic pregnancy and pelvic hæmatocele, although gynecologists assert the former to be an almost invariable cause of the latter; next a paragraph noting the possibility of the coexistence of adnexal and appendiceal inflammatory lesions; five pages later we are greeted with ruptured pyosalpinx, and, finally, after perusing five more pages, we are again presented with a paragraph on tubo-ovarian inflammation. Any disease accompanied by vomiting, abdominal pain, tenderness, and rigidity is liable to be confused with appendicitis. We feel confident that a list of these conditions with the distinguishing features following each would be infinitely less laborious and much more lucid. Perityphlitis and paratyphlitis are recognized, and the differential diagnosis given. We note the absence of pleurisy, pneumonia, dysmenorrhœa, intestinal parasites, acute chemical poisoning, cholera morbus, mesenteric thrombosis and embolism, and the abdominal type of influenza, all of which may be mistaken for appendicitis. In the table differentiating appendicitis from hepatic and renal colics we would have included jaundice and the history; in the one differentiating appendicitis and tubo-ovarian inflammation, the fact that salpingitis is usually bilateral, the pain often shoots down the thigh, and the hymen is absent; and under gall-bladder lesions we would have included the fact that chills are commonly present.

In the treatment of peritonitis, Fowler deprecates the scouring of the intestines with gauze to remove patches of lymph, and places the patient in the elevated head and trunk posture to facilitate the passage of fluids away from the dangerous areas of absorption in the diaphragm. Theoretically, this procedure is as highly rational as ligaturing a limb in snake-bite, the poison entering the general circulation in greatly diminished quantities. It is diametrically opposed to the postural drainage of Clark, which we believe it will finally supplant.

Appendectomy is recommended as soon as the diagnosis of progressive appendicitis is assured. Concerning the time at which to operate, the author states that a case demanding operation within twenty-four hours of its onset is exceptional, but that if the patient is not practically well at the end of that time operation is demanded. Regarding the removal of the appendix in every case we gather that the author sometimes leaves it in the abdomen, contenting himself with drainage, but this is not definitely stated in the text.

To prepare a room for operation we are advised to remove everything portable except the carpet, which should be thoroughly soaked with several gallons of corrosive sublimate solution, "the carpet should be so wet that the water oozes from the latter when it is walked upon, as water is forced from a wet sponge when it is squeezed." The author might have added that the floor should have been well calked, and the surgeon should wear rubber boots.

Fowler employs the intermuscular operation when possible, practises typical excision of the appendix when conditions permit, and closes the abdominal wound when it goes directly into the peritoneal cavity, by a removable layer suture of silkworm-gut, which resembles the lacing of a shoe.

The work is concluded with a chapter on appendicular lesions from foreign bodies, typhlitis, perityphlitis, and paratyphlitic abscess.

The book is an exposition of the author's views and methods, based on an extensive personal experience. Little reference is made to the work of others. In its pages the alert surgeon will find little with which he is not already familiar; the general practitioner and occasional operator may find much valuable information whose guidance can be trusted with safety. F. T. S.

INTERNATIONAL CLINICS. A Quarterly of Clinical Lectures and Especially Prepared Articles on Medicine, Neurology, Surgery, Therapeutics, Obstetrics, Pediatrics, Pathology, Dermatology, Diseases of the Eye, Ear, Nose, and Throat, and other topics of interest to students and practitioners. Edited by HENRY W. CATTELL, A.M., M.D. Tenth series, Vols. III. and IV. Eleventh series, Vol. I. Philadelphia: J. B. Lippincott Co., 1900–1901.

WITHIN the year we reviewed the first two volumes of this series, and called attention to what we regarded as defects therein contained. To Volume III. our criticisms do not apply, for whether the "symposium on genito-urinary diseases" with which it opens, or the scholarly monograph on the "scientific modification of milk" with which it closes is worthy of greater commendation, it is difficult to decide, but the fact remains that there is not an uninteresting section in the volume. And what do we find? Valentine, on "Aseptic Urethral Instrumentation," concise, practical, and thorough; "Retrogenital Chancres," by Bulkley, a most industrious collection of facts along this line; from the enormous field of the St. Louis Hospital, Fournier on the "Treatment of Soft Chancres;" Lewis, with a "new ureter cystoscope," and its use in the male; Gottheil, on various syphilitic manifestations, with illustrations so lifelike that even the patient's trousers form a realistic background; Peabody for the liver and Fisher for the nervous system in syphilitics close the symposium. Therapeutics is well to the front with several practical articles, so practical that even a carping critic hesitates to suggest that Lagrange means "tuberculosis" when he writes "tubercular." Then, in medicine, a posthumous paper by Da Costa is fruitful, not only for variety of subjects, but in hopefulness of result. Bishop gives a brief account of some diseases as he has found them in the "Colored Hospital." Very satisfactory, for it shows careful observation. The prescription on page 97 ignores the fact that *spiritus* is a noun of the fourth declension. In neurology Walters gives a succinct table of the stigmata of degeneration (p. 146), evidently based on extended observations; of especial value are his preliminary remarks. Surgery, obstetrics, and gynecology, and diseases of the eye and ear each have received attention. The article by Krause on the "Use and Care of the Microscope" should be read by every laboratory worker, for he rather than the practitioner abuses his instrument. We have read this volume in the intervals of engrossing work, and although it is by no means sketchy, as one author designates his contribution, it is not lacking in freshness of thought and in capability of sustained interest. We regard it as a distinct improvement upon its immediate predecessors, and trust that its high standard may be maintained.

R. W. W.

Volume IV. of the tenth series of this valuable publication contains a number of articles written by men prominently identified with the subjects on which they have written.

The subjects are treated under seven headings—therapeutics, genito-urinary diseases, medicine, neurology, surgery, pathology, and laboratory methods, and the work is concluded with a monograph by Dr. Cattell entitled "The Etiology and Morbid Anatomy of Various Diseases," which is, in fact, a condensed quiz compend.

A. Potain contributes an article on the indications and contraindications of digitalis in treating heart disease. Renault, Pedersen, Guyon, Ohmann-Dumesnil, and Fournier all contribute to the symposium on genito-urinary diseases; A. V. Meigs lectures on "Cases Presenting Renal, Cardiac, and Pulmonary Lesions," abstracted from his clinics at the Pennsylvania Hospital, while Deaver gives a series of abstracts from his clinics at the German Hospital of Philadelphia, including descriptions of a number of operations, the technique, preparation, and after-treatment. The two articles of most popular as well as medical interest in the volume are "Mosquitoes and the Prophylaxis of Malaria," by B. Grassi, of Rome, and "Blastomycetes as the Cause of Cancer," by Roncali, also of Rome.

Grassi states that malaria is conveyed solely by mosquitoes of a certain variety under certain conditions of temperature; that it has proved impossible to produce malaria through the agency of water, air, or other insects, or through other varieties of mosquitoes, and that the biologist should be content to look no further for other causes of the disease when the conditions of the intermediate life of the organism in the mosquito are of such a delicate nature that the mere substitution of another variety of mosquito in the link of life is sufficient to break the chain. Roncali believes that cancer is a parasitic disease, and that blastomycetes, near relations of the ordinary ferments, are probably the cause.

In the AMERICAN JOURNAL OF THE MEDICAL SCIENCES for May, 1901, H. R. Gaylord, of the New York State Laboratory, published an exhaustive article in which he claims to have discovered the cause of cancer to be a form of protozoon, and in inoculation experiments has had most remarkable results. He has succeeded in producing carcinomatous and sarcomatous growths in animals by inoculation with carcinomatous and sarcomatous material as well as with pure cultures (?) of the organism. The author, however, has not described his methods of obtaining pure cultures and the culture media used, and until these important points are made clear we cannot consider that any connection between the organisms and the disease has been proved. It is only fair to Dr. Gaylord to state that he promises in a subsequent article to give the details of the culture methods, etc., used in the experiment. The whole volume is of particular interest, and should prove valuable in keeping practitioners up to the mark in the study of medical progress.

Volume I. of the eleventh series contains articles and clinical lectures by prominent teachers and clinicians of various countries, including Italy, France, England, Scotland, and the United States, though contributions from German writers have been conspicuous by their absence in the last two issues.

The contents are grouped under eight headings, namely, therapeutics, medicine, neurology, surgery, obstetrics, and gynecology, diseases of the eye, laboratory methods, and progress of medicine.

Under therapeutics there are three contributions: "Notes on New Remedies," by A. A. Stevens; "Treatment of Chronic Gonorrhœa or Gleet," by A. Renault, and the "Treatment of Eczema," by H. Hallopeau. The articles and clinics on medicine are contributed by Delafield, Batty Shaw, Marx Biss, Campbell Williams, and S. Solis-Cohen.

In the portion of his clinic devoted to the treatment of pneumonia Cohen speaks of the treatment by saline infusions, first introduced in the Philadelphia Hospital in 1889—a method of treatment the value of which we believe has not been thoroughly appreciated as yet.

Clinics by Rodman, Roncali, Elsberg, and Holmes make up the chapter on Surgery, while Deaver, Doleris, and Kynoch lecture on obstetrics and gynecology; Edward Jackson writes on "Points in the Diagnosis of Iritis and Glaucoma;" Walmsley, on "Some Practical Methods in Photomicrography," and last, but by no means least, Blackwood gives a valuable "Review of the Progress of Medicine During the Year 1900," writing on subjects in medicine, therapeutics, serotherapy, neurology, and surgery.

The work is well prepared, the articles carefully written, and the book itself published in a very attractive form. J. N. H.

A MANUAL OF MATERIA MEDICA AND PHARMACOLOGY. By DAVID M. R. CULBRETH, Ph.G., Professor of Botany, Materia Medica, and Pharmacognosy in the Maryland College of Pharmacy; Associate Professor of Materia Medica and Pharmacognosy in the University of Maryland Medical and Dental Schools. Second edition, enlarged and thoroughly revised. Pp. xv., 885. Philadelphia and New York: Lea Brothers & Co., 1901.

THIS work treats of all drugs of organic or inorganic origin which are or have been official in the *United States Pharmacopœia*, together with those of important allied species and useful synthetics, and is embellished with four hundred and sixty-four illustrations. Some four years ago we called attention to the many excellencies of the first edition. We note with interest the improvement which experience has prompted the author to make. First, as to arrangement, we note an entire revisal of the sequence of drugs derived from the vegetable kingdom; they now are arranged commencing with the simplest plant and ending with the most complex. The animal drugs begin with those derived from the lowest grade and ascend to those of the highest development. The remaining drugs, inorganic, carbon, and synthetic compounds, are arranged on a chemical basis. This is a distinct improvement, in that it follows the natural order of evolution, excepting in order of main divisions, which would be, of course, inorganic, vegetable organic and animal organic drugs. We note, also, the endeavor of the author to popularize the metric system of measurements by giving it the preference, and in this the book will find many imitators. Further, the physiological action of remedies has been extended, and toxicology has received attention. Many observations might be quoted with approval, but this may indicate the trend of the author's mind. "Arrangement by alphabetic sequence. This is the least scientific but the most popular; in fact, it is not a true system, as no tacit relationship in any particular exists between the associated subjects, save that of initial letter in spelling, which can offer to the student the trifling advantage of texical convenience." Naturally, with predominant logical faculty the matter is arranged with a view of the student's acquisition of tone perspective and ready association of correlated facts. Of matters which might have been left for other treatises, we formerly suggested the "Microscope and its use in materia medica." "Poisons—treatment and antidotes" might also be open to the same remark were it not for the fact of the great excellence of this portion of the appendix. "Prescription writing of the physician" is somewhat refreshing in the advice that an indifferent penmanship should be improved by careful practice, "so as to make sure that you know how to write before knowing what to write." This statement, evidently suggested by experience, is respectfully submitted for the consideration of State boards of medical examiners. One matter which in our opinion is quite as important for the student of pharmacy to remember has been omitted: That when a pharmacist is called upon to furnish a copy of the prescription that it should be an exact copy, *verbatim et literatim*. This we have never found done, but the alleged copy is a strange mixture of cases and genders, or an aggregation of uncouth abbreviations. The book is better for having its index in larger type than was employed in its predecessor.

This edition shows the same painstaking accuracy, extensive reading, and satisfactory treatment of the various topics; naturally with greater stress being placed upon the vegetable materia medica, although the inorganic and synthetic compounds are by no means neglected. We are still of the opinion that the pharmaceutical, rather than the medical, student will find it better adapted to his requirements. The latter will probably devote less time to the substance and more to what it will do and for what it is used. The work has occupied the leading place which we predicted for it, and this edition makes it still more worthy of its prominent position. R. W. W.

An American Text-book of Physiology. Edited by William H. Howell, Ph.D., M.D., Professor of Physiology in Johns Hopkins University. Two volumes, royal octavo, of nearly 600 pages each, fully illustrated. Philadelphia and London: W. B. Saunders & Co., 1900.

The science of physiology changes so rapidly and new ideas and theories displace old and accepted ones with such swiftness that new editions of a text-book on the subject are frequently necessary in order to keep pace with the general advance. The first edition of the *American Text-book of Physiology* at the time of its publication represented the very latest phase of the subject; but in the comparatively short time since it appeared, owing to the rapid advance in this as in allied branches of medical science, as well as to the exhaustion of the first edition, the second has become necessary, and is now given to the profession, embodying the latest ideas on the subject. A critical review of the *Text-book* as a whole is hardly necessary, as it is known to the student and practitioner as a standard work by the most eminent men in this branch in the country, and the present edition is a worthy successor of the preceding one. Written by a number of men, most of them professors of physiology in the leading medical schools of America, each of whom has contributed special chapters on the subjects they are most fitted to write upon and expound, the work has an authority and a breadth that are seldom attained by a one-man book, and, though many of the papers slightly overlap each other in their scope, the whole result is remarkably harmonious. Many parts of the second edition have been rewritten, with numerous excellent illustrations, notably the chapter on the Central Nervous System, which has been much extended and brought thoroughly up to date, while the section on Physical Chemistry is a very valuable and ably written addition that will prove of great help to the student of physiology, as the subject has come into a great deal of prominence lately. In the other sections many old theories have been discarded where they have been shown to be wrong, their places being taken by the latest discoveries and the subjects treated from the newer points of view. Throughout the book references are given in numbers, forming quite a complete bibliography in most sections, though in others they are not so frequent. Owing to the rather unwieldy size of the first edition, the present one has been brought out in two volumes, each of a very convenient size, of about six hundred pages each. There have also been some slight changes in the order of subjects, necessitated by the division of the work, though the general arrangement is the same as before. A table of contents in each volume and a revised and enlarged index are a very considerable aid in tracing out any desired subject. The whole work is excellently written and well fulfils its mission—that of a standard American text-book.

G. M. C.

PHYSIOLOGY: A MANUAL FOR STUDENTS AND PRACTITIONERS. By HOWARD D. COLLINS, M.D., Assistant to the Attending Surgeon of the Roosevelt Hospital; Assistant Demonstrator of Anatomy, College of Physicians and Surgeons (Columbia University), New York; and WILLIAM H. ROCKWELL, JR., M.D., Assistant Demonstrator of Anatomy, College of Physicians and Surgeons (Columbia University), New York; Member of Association of American Anatomists. Pp. viii., 323. Philadelphia and New York: Lea Brothers & Co.

To write a manual is by no means an easy task, for it necessitates a thorough knowledge of the subject, a fine discrimination of the relative importance of topics, and an accurate judgment of the value of recent additions to special knowledge. Finally, the language should be terse and the statements without ambiguity. When the authors have reached this degree of excellence a manual is useful in two ways: for the student who from it may acquire the essential facts as a basis upon which to rear a more elaborate structure from reading or lectures, and for the practitioner who wishes to systematically refresh his memory and know the modern phases of old questions. In both form and substance we find much upon which to congratulate the student. Inasmuch as modern therapeutics is based upon accurate physiological knowledge the busy practitioner will find satisfaction in perusing its pages. He will find explanations of well-known clinical facts and for himself draw conclusions of value. For instance, a reading of the "time of the cardiac cycle" (p. 62) gives ready suggestion of the speed of tiring of the rapidly acting heart. Or if "localization of brain function" has become a mere shadow on pp. 199 *et seq.*, he will find a forceful, if brief, presentation. Or if embryology has survived as part of a dry introduction to text books in obstetrics, pp. 266 *et seq.*, will come as decidedly simple and fairly complete view of the subject. The neuron is dismissed rather briefly (p. 165), but possibly the authors think that enough has been written from other stand-points. We have indicated briefly how this book can be useful, and in so doing have shown our appreciation of the very excellent work of the authors. The way of the student has been made easier; let us hope that he learns his lessons more thoroughly.

R. W. W.

DISEASES OF THE EAR, INCLUDING THOSE OF THE NOSE AND THROAT IN RELATION TO THE EAR. By THOMAS BARR, M.D. Third edition, revised and partially rewritten. Glasgow: James Maclehose & Sons, 1901.

THIS excellent manual for the use of students and practitioners now appears in its third edition. It is one of the most practical, and, for its size, complete books of the kind which we have. One especially attractive feature in the work is the concise and authoritative manner in which the author speaks. Every topic shows that it is discussed from the stand-point of one who is a thorough master of his subject.

The illustrations of the work are superior to most of those to be found in books of this character in the possession of particular value as illustrating the text which they accompany. Some of the photographs, such as those of the facies in adenoids or in facial paralysis, are much above the plane of those usually used for the illustration of such conditions.

The discussions of the various subjects are arranged in such a way as to make them very easy of reference, and one cannot but feel that the great success obtained by Dr. Barr's book as a text-book has been fully justified by the skill with which he has arranged his subject-matter.

F. R. P.

ATLAS OF THE NERVOUS SYSTEM, INCLUDING AN EPITOME OF THE ANATOMY, PATHOLOGY, AND TREATMENT. By CHRISTFRIED JACOB. Edited by EDWARD D. FISHER, M.D. Philadelphia and London: W. B. Saunders & Co., 1901.

THE idea dominating the writing of this book was that accurate pictures teach more than long verbal descriptions. The idea is well carried out, and the result is a very useful book. There are a few diagrams, but most of the plates represent actual sections. It will be of great use to the student wrestling with the much-dreaded question of nervous anatomy and pathology. Interest is added to many of the plates by the fact that oftentimes a short history of the case from which the specimens were obtained is given. The first twenty-two pages contain a description of the general anatomy of the nervous system. This is followed by chapters on development and physiology. Then comes general pathology, including causation, symptomatology, and methods of examination, and, finally, brief but good sketches of the lesions in special diseases. The book is most excellent, and should be bought and studied by all who are interested in nervous diseases. C. W. B.

PROGRESS

OF

MEDICAL SCIENCE.

MEDICINE.

UNDER THE CHARGE OF

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On the Treatment of Aneurisms by Injections of Gelatin.—GRENET and PIQUARD (*Arch. Gén. de Méd.*, 1901, 78, Ann., n. s.v. 641) consider carefully the question of the value of the treatment of aneurism according to the method of Lancereaux by the injection of solutions of gelatin. The study is based upon one personal observation and a careful analysis of 100 cases in literature. They divide the cases into four groups: In the first, including eleven cases, the observations are without value with regard to the result of treatment. In the second group of five cases there were grave sequels which may have been due to the treatment. In a third group of twenty-five cases the treatment had no apparent influence. In the fourth group there was more or less temporary or permanent improvement—forty-nine cases.

In a discussion of these cases, however, they come to the conclusion that the relation of these apparently good results to treatment is extremely doubtful. After inquiring into the evidence concerning the absorption and the coagulating power of gelatin injected subcutaneously, and into the dangers of such methods, they come to the following conclusions:

1. Injections of gelatin are indicated, according to Lancereaux, only in saccular aneurisms; nevertheless, according to Bourdillon, their favorable action is not limited to the encouraging of the deposition of clots, but may be exercised also even in fusiform aneurisms.
2. The pain and fever which often follow injections result from the action of the gelatin itself.
3. The possibility of embolism and of massive coagulation is not positively demonstrated.
4. It is possible, if gelatin passes into the blood without undergoing transformation, that the injections may, in certain voluminous aneurisms of

large size with feebly resistant walls, determine a deleterious increase in pressure.

5. Despite the large number of patients who have seemed to be relieved as a result of the injections it is impossible to draw positive conclusions from the statistics, inasmuch as the observations have been for the greater part insufficient, and the subjects have been rarely followed after the conclusion of treatment.

6. Experiments as well as clinical facts do not permit conclusions as to the value of treatment. It seems practically proven that gelatin injected subcutaneously is absorbed, but it is not known whether it is absorbed as gelatin. Even if one assumed that it passes into the circulation without modification it would yet be necessary, in order to learn its therapeutic action, to study not only its immediate influences, but also its later effects, which are, perhaps, as a comparison with peptone would suggest, entirely different.

7. The study of the action of gelatin in subcutaneous injections is to be reconsidered from a clinical stand-point, and is as yet incomplete experimentally.

The Experimental Production of Hepatic Lesions of Splenic Origin.—CHAUFFARD and CASTAIGNE (*Arch. de méd. exp. et d'anat. path.*, 1901, xiii., 321) have made an interesting set of experiments demonstrating the possibility of the passage of various harmful and innocuous substances from the spleen to the liver, with subsequent localization in that organ and the production, sometimes, of pathological changes limited to the liver and spleen. These observations are of interest in connection with the recent studies of Collet and Gallavardin upon primary splenic tuberculosis with secondary hepatic involvement which have recently been referred to in this JOURNAL. They appear to have proved from an experimental stand-point (1) that solid particles introduced into the parenchyma of the spleen may reach the liver and become localized there; and (2) that tuberculosis limited to the liver may follow a primary localized splenic tuberculosis. By a series of experiments they were able to demonstrate the fact that, when injected into the splenic pulp, carmine reached the liver only after several days, while, when the injection is made into the splenic artery, the substance is to be found in the liver in twenty-four hours.

Three interesting series of experiments were made with intrasplenic inoculation of tuberculosis in guinea-pigs. In the first series six animals were inoculated with a culture of human tuberculosis and all killed inside of about two months. In all instances the lesions were purely splenic. In a second series six guinea-pigs were inoculated with tuberculous products from the spleen of a subject dead of general tuberculosis of extreme virulence. In all of these instances a more or less general tuberculosis developed. In a third series six guinea-pigs received an intrasplenic injection of several drops of a triturate of the tuberculous spleen of a guinea-pig dead of experimental tuberculosis. In practically all of these cases there were found, after one month to a month and a half, caseous tuberculosis of the spleen and fresh embryonal tuberculosis of the liver. In no case were any tuberculous lesions found elsewhere. They believe that these results show that, according to individual conditions of virulence of the bacilli, splenic tuberculosis may remain limited to this organ or extend to the liver in a strictly splenohepatic type, or, passing onward, become disseminated.

Nervous Complications and Sequelæ of Malarial Fever.—BUSQUET (*Rev. de méd.*, 1891, xxi., 441) reports the case of a patient who had four distinct attacks of malarial fever in three months, each of which was associated with interesting nervous phenomena. In November, 1897, the patient, while in Madagascar, had a pernicious comatose paroxysm. After his recovery he began to suffer from girdle pains, which, however, yielded to treatment with quinine. In January, 1898, he began again to have attacks of intermittent fever with a rapidly developing anæmia, as a result of which he was sent to Marseilles. On May 16th the patient had a chill. There was marked paresis of the right arm and leg, the right arm showing a rhythmical tremor which persisted during effort, and as a result of which he found it difficult to feed himself. The right leg when flexed showed spontaneous epileptoid tremor, with oscillations of great amplitude; general sensation good. The right patellar reflex was greatly exaggerated and accompanied by a clonus. The left was slightly exaggerated; there was ankle clonus on the right side; the plantar reflex absent on the right, increased on the left. There was incontinence of urine. The blood showed malarial parasites, both of the acute cycle and crescentic. (The observer states only that amœboid and crescentic forms were found.—W. S. T.) Under quinine the fever and all the nervous symptoms entirely disappeared. In four days most of the symptoms had yielded. In two weeks the treatment was stopped. In five days the nervous symptoms reappeared, and three days later incontinence of urine. On June 10th there was a febrile paroxysm, and on the following day incontinence of feces. Under treatment by quinine the symptoms again cleared up in a few days, though the incontinence of urine lasted for eight days. Treatment by quinine was stopped after ten days. Four days later the incontinence of urine appeared, and on the following day there was another febrile paroxysm. He was then given a hypodermic injection of 2 grammes of hydrochlorate of quinine, and afterward a gramme a day for eight days, then 0.5 up to July 12th. Three days later fever and incontinence of urine again developed, which yielded once more in a few days to quinine. On July 26th the patient left the hospital feeling well. The authors believe that the nervous phenomena were probably due to the direct irritation of the central nervous system by the parasites in the circulation.

Polymyositis.—LEPINE (*Rev. de méd.*, Paris, 1901, xxi., 426) adds an interesting case to the few instances in literature. The patient was a man, aged fifty-nine years, who entered his clinic on January 24, 1901. He was a cabinetmaker, of good family and personal history, and excellent habits. Eight months before entry he began to suffer from intermittent pains in the head, of moderate intensity, with occasional lancinating pains in the left side, in the mammillary region.

Three months before entry the patient discovered a swelling in the right temporal region, a small, œdematous, slightly tender, but rather hard tumor.

This lasted three or four days, during which there was considerable difficulty in chewing. After several days this disappeared, and a similar swelling appeared on the right, extending, however, to the eyelids so as to cause complete closure. After fifteen days these symptoms disappeared. At this time extremely severe pains appeared in the lumbar region, especially on movements of flexion and rotation. Six days before entry there appeared on the dorsal surface of his right forearm a small œdematous swelling, which was associated with sensations of pricking. From this the œdema spread over the entire forearm and dorsal surface of the hand. The patient was thin and pale. The forearm showed a glistening œdema, somewhat reddened, owing perhaps to applications of tincture of iodine, hard, but neither hot nor tender. A softer œdema was present on the back of the hand. Nothing was to be made out on physical examination of the back. The spleen was enlarged, and there was an anæmia of two million red blood-corpuscles; the colorless corpuscles were apparently normal; the hæmoglobin relatively diminished. Cultures from the blood were negative. The urine was free from albumin. The patient was treated by aspirine. The lumbar pains disappeared, while the swelling of the forearm progressively diminished in the course of several days.

The author discusses the term dermatomyositis. He prefers the term polymyositis to dermatomyositis, inasmuch as the cutaneous eruption observed in some cases is not a necessary symptom. He does not consider Lorentz justified in separating dermatomyositis from polymyositis hemorrhagica.

The Clinical Diagnosis of Infarctions of the Kidney.—R. SCHMIDT (*Wiener klin. Wochenschrift*, 1901, xiv., 451 and 486), after calling attention to the fact that most observers have held that the diagnosis of infarction of the kidney is rarely possible, reviews seven cases, five out of the literature and two from the clinic of Prof. Neusser, in Vienna, in which the symptoms were carefully observed during life, necropsy proving the nature of the lesion. After considering the various symptoms he comes to the following conclusions with regard to differential diagnosis:

1. In every case of renal colic it would appear to be advisable first to settle the question as to whether it is of intrarenal (increased pressure, necrosis) or of extrarenal—that is, ureteral (passageverlegung).

2. Renal pain of intrarenal origin remains in general more localized in the actual renal region; the kidney, especially in infarction, is exquisitely tender on pressure, the pain is more continual; it is sometimes accompanied by very intense albuminuria of sudden onset or with a sediment similar to that in nephritis.

3. Colic pain of extrarenal—that is, ureteral—origin has a greater tendency to radiate in the course of the ureters; there is tenderness of the ureters on pressure; this may result in an acute hydronephrosis; the pain is more intermittent.

4. Renal colics of intrarenal origin may be caused by:

(*a*) Torsion of the vascular pedicle in wandering kidney.

(*b*) Sudden congestion in richly vascular malignant tumors.

(*c*) Chronic nephritis with an acute inflammatory exacerbation.

(*d*) Renal infarct.

5. With regard to differentiation within these groups one should consider that pain on pressure over the kidneys is greater and more commonly present in renal infarct than in chronic nephritis.

High pulse tension speaks against infarct.

Onset of the attack of colic during rest in bed is common in infarct. A relation between the attack of colic and mechanical insults often occurs in cases of torsion of the vascular pedicle and in acute exacerbations of chronic nephritis.

An apoplectic onset of the pain at full intensity is especially common in infarct.

Marked hæmaturia is common in the acute exacerbations of chronic nephritis, but rare in infarct.

Intense albuminuria of sudden onset and rapid disappearance, without abnormal sediment, occurs in infarct.

6. Enteroptosis is an unfavorable complication from a prognostic standpoint in renal infarct; it favors the onset of reflex vomiting.

7. Decubitus on the healthy side or in bilateral lesions on the less diseased side causes an increase of pain in painful renal infarction.

8. In total closure of the renal artery there may be no abnormal appearances in the urine (complete shutting off of the kidney).

9. Oliguria or even anuria occurs, especially in bilateral renal infarcts; vesical tenesmus is not present.

On the Albumineid Metabolism in Pernicious Anæmia and Bothriocephalus Anæmia.—ROSENQVIST (*Berl. klin. Wochenschrift*, 1901, xxxviii., 666) states that after the investigations of Bauer it was generally believed that in all anæmias there was an increased disintegration of albumin, but von Noorden and Lipman-Wulff showed that anæmia as such was not necessarily associated with pathological increase in the albuminoid metabolism; that if such occurred in an anæmic patient it spoke for the existence of other deleterious influences. In pernicious anæmia, however, Strümpell, Quincke, and Eichhorst have shown that an increased disintegration of albumin may occur, though most of the observations have scarcely been made with the exactness attained by modern methods. For this reason the author has studied eighteen cases of bothriocephalus anæmia and three of cryptogenetic pernicious anæmia in the clinic of Runeberg, in Helsingfors. In eleven out of fifteen cases of bothriocephalus anæmia, before the institution of anthelmintic treatment, there was a well-marked increase in the albuminoid metabolism. This was present not only in the cases with fever, but also in those without. Immediately after treatment and the disappearance of the worm the picture changed entirely, and there was, on the other hand, a well-marked nitrogenous retention. This was observed in all cases, even in those in which the diet and general conditions after the disappearance of the worm were not the best. In some cases there may be a retention of nitrogen even during the presence of the worm. The fact, however, that in all cases after the disappearance of the worm there was a well-marked increase in the albuminoid retention justifies the conclusion that in every case of bothriocephalus anæmia there are periods of pathologically increased albuminoid disintegration. This albuminoid disintegration is far too extensive to be dependent entirely upon the destruction of red blood-corpuscles; it must be associated with changes in the other nitrogenous tissues of the body. The deleterious substance which produces these changes the author believes to be a poison produced by the parasite. As a general rule, the changes in the albuminoid metabolism go hand-in-hand with fluctuations in number of red blood-corpuscles, but exceptions to this rule occur. In seven cases in which the number of erythrocytes before the treatment was essentially constant there was a well-marked elevation in the albuminoid disintegration. We are thus, he believes, not justified in concluding, from a pause in the progress of the anæmia, that the poison is no longer active. In a certain number of cases the change for the better after treatment does not occur until some days after the expulsion of the worm. In five instances six to eleven days elapsed before essential change was to be noticed. This he believes to be due to the fact that the poison has not yet been eliminated. As a general rule, in these instances the elevation of temperature which commonly disappeared after expulsion of the worm remains present until the evidence of the presence of the poison, the increased albuminoid disintegration, and the anæmia begin to change for the better. In bothriocephalus anæmia the elevation of temperature stands apparently in direct relation with the poison produced by the worm; it may be regarded as a fever of absorption. In a certain number of cases Rosenqvist has found that, after expulsion of the worm, during the period in which the most marked increase in the number of blood-corpuscles begins, at a time of almost total nitrogenous retention, the quantities of phosphorus purin increased, and might even reach three times the previous figures despite the fact that the patient was on a purin-free diet. Whether this has anything to do with the increased destruction of nuclei of the erythrocytes is a question which cannot yet be decided.

In cryptogenetic pernicious anæmia the observations were essentially similar to those in bothriocephalus anæmia. Periods of marked increase of albuminoid disintegration alternated sometimes with those of distinct nitrogenous retention. These conditions varied from day to day; here, also, there was a certain parallelism between the changes in the nitrogen metabolism and those in the condition of the blood; also the elevations of temperature occurred only during the periods of pathological albuminoid disintegration.

He concludes "that bothriocephalus anæmia is a toxic anæmia. In every case of this blood disease there is, at certain periods, an increased albumin disintegration which is brought about by a poison produced by the tapeworm. This increased albuminoid metabolism is, however, not always to be made out in a given case, for despite the presence of the tapeworm there may be periods of well-marked nitrogenous retention.

"A comparison between the results found in bothriocephalus anæmia and those in pernicious anæmia from other cause shows that there is no essential difference between the albuminoid metabolism in the two diseases.

"My investigations, therefore, are strongly in support of the theory that cryptogenetic pernicious anæmia is also a toxic anæmia."

Puncture of the Sacral Canal by the Epidural Method.—CATHELIN (*La Presse Médicale*, June 15, 1901, p. 281) describes a new line of treatment for the relief of the intense pain of various diseases by the injection of cocaine into the sacral canal. The technique is described as being extremely simple. Looking at the skeleton it will be seen that the vertebral canal ceases near the lower extremity of the sacrum. Its lower end is covered in by the sacrococcygeal ligament. The spinous processes of the fourth and fifth sacral vertebræ are absent, so that there is normally a triangular space with the apex upward in this situation, bounded on each side by the fourth and fifth sacral tubercles, which represent the rudimentary articular surfaces. It is at the apex of this triangle that the cocaine injections are made.

For the injection an ordinary syringe of about 10 c.c. capacity is used. The needle should be six centimetres long, with a diameter of seven-tenths of a millimetre, and a bevelling of three millimetres at the point.

The patient is placed either in the knee-elbow position or on the side. After thorough disinfection of the sacral region, and with the usual precautions, the finger is pressed down the median line of the sacrum until it falls into the triangular depression described above. The needle is introduced about at the apex of this triangle and exactly in the median line. It is passed in obliquely upward and forward, and if inserted properly it will be felt to pass through the sacro-coccygeal ligament, by which it is firmly gripped.

The quantity of cocaine to be injected is four centigrammes. For the purpose a solution of the strength of 1 to 100, or, better, 1 to 200, should be used. The cocaine, it is to be remembered, does not enter the subdural or subarachnoid spaces, but is injected into the epidural space. It is not supposed to exert its effect by direct action on the nerve roots, but is absorbed by osmosis by the rich plexus of veins in the vertebral canal, and appears to act by dulling the general nervous sensibility.

This treatment is recommended for the relief of the following painful conditions: painful neuralgias of the lower extremities, sciatica, lumbago, the lightning pains of tabes, intercostal neuralgia, and gastric crises. It is further recommended for the pain in inoperable carcinoma of the rectum, for fissure in ano, for painful labor, and for painful affections of the joints of the lower extremities.

On Scleroderma.—NEUMANN (*Deutsch. Arch. f. klin. Med.*, 1901, lxx., 168) describes five carefully studied cases of scleroderma. In two of these there was a goitre; in four the condition was ushered in by rheumatoid pains, in three the diagnosis of chronic rheumatism having been made at the onset. In four there was marked pigmentation; in several so much so that the appearance of the patient was almost that of a subject of Addison's disease; the pigmentation, however, was never present on the conjunctiva or mucous membrane. In one instance, two years before death, the sclerodactylia became so marked that actual mutilation of the phalanges resulted. About the joint of the last phalanx, without any sign of local irritation, there developed, quite as in ainhum, a contraction of the white skin, which resulted in a dry necrosis of the nail and the tip of the finger as well as of the spongy end of the last phalanx. The course of this necrosis lasted several months, and was associated with severe pain. The end of the phalanx was black, dry, and mummified, and ended in a slowly developing scar formation. Out of the base of the scar protruded the very tender end of the bone.

In discussing the observations the author calls attention to the striking likeness between the extensive scleroderma and Addison's disease. In scleroderma, however, the pigmentation of the conjunctiva and mucous membrane of the mouth is absent, while in Addison's disease the doughy swelling and thickening of the skin, with associated pigmentation in various places and absolute loss of pigment elsewhere, are never present. Moreover, the loss of strength in true Addison's disease and the more rapid course are characteristic of most, if not all, the cases.

Neumann is inclined to believe that the condition represents a chronic intoxication, probably of a non-bacterial nature.

The prognosis he considers extremely grave. Although improvements and recoveries are occasionally spoken of, the possibility of the latter he considers very slight, most cases in which recovery is supposed to have occurred having been imperfectly reported.

With regard to treatment, Neumann has obtained little result from internal medication. On the other hand, in his three last cases marked improvement has followed the persistent use of hot-air treatment.

On Occult Hemorrhages into the Stomach.—Boas (*Deutsch. med. Wochenschrift*, 1901, xxvii., 315) mentions the fact that if gastric hemorrhages are of very slight extent they may be entirely overlooked, especially in an acid medium, and he has been struck by the fact that, with careful methods, blood may not infrequently be demonstrated in specimens of gastric juice in which, macroscopically, it might never have been suspected. He prefers Weber's modification of the guaiac test, and states that special care should be taken that the tincture should always be freshly prepared. This he believes to be the most delicate method, especially if the ethereal solution, after the addition of tincture of guaiac and oil of turpentine, is shaken out in water and chloroform, and the mixture allowed to stand for a considerable time. The gastric juice to be examined should be taken by means of the stomach-tube and with great care. The vomitus often contains blood from other regions. The observations of Boas have been limited to eighty-three cases, including a variety of different conditions. He divides his results into three classes: 1. Those in which hemorrhages were constantly absent. 2. Those in which they occasionally occurred. 3. Those in which they were always found. The first group included all the cases of neuroses as well as those of gastritis anacida, with one exception, and, further, a case of subacidity, and all cases of superacidity, supersecretion, and benignant dilatation. To the second class belong the cases of ulcer of the stomach or secondary pyloric stenosis following ulcer. Blood was occasionally found also in a case of duodenal stenosis, and also in a case of syphilis of the stomach, as well as in an instance of carcinomatous stenosis of the large intestine. In the third group fell one case of hypertrophic stenosis, and all the cases of carcinoma of the stomach. In every one of these latter blood was invariably found, although in the majority it was not to be made out on gross examination.

The clinical importance of this seems to be that blood is especially likely to be present under three conditions—in typical ulcer, in tumors with a tendency to ulceration, and, finally, in conditions of well-marked chronic passive congestion. In combinations of these conditions the tendency is, of course, correspondingly greater. It is, of course, evident that the determination of small quantities of blood in the stomach does not give us a diagnostic sign, but Boas believes it is an important addition to our methods of diagnosis. It may help us to distinguish doubtful cases of ulcer from gastric neuroses, and if it be a question of carcinoma the great frequency of the presence of blood in this condition is in sharp contrast to the fact that in chronic anacid gastritis, as well as in gastric neuroses, no blood has been found. Inasmuch, however, as ulceration which occurs in the majority of all cases of carcinoma is not a very early symptom, the presence of blood in most instances will hardly help us to an early diagnosis. Boas further raises the question as to whether the constant loss of small quantities of blood may not play an important part in the development of the so-called carcinoma cachexia.

SURGERY.

UNDER THE CHARGE OF

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The Advantages and Disadvantages of Drainage after Abdominal Operations.—ROBB (*Journal of the American Medical Association*, July 6, 1901) reports two series of cases, in the first of which there were 114 and in the second 108 consecutive unselected abdominal sections without a death. In a paper published in 1890 the author summarizes the indications for drainage as follows: 1. To provide a means of escape for the serous oozing which follows the separation of broad adherent surfaces. 2. To guard against septic peritonitis from retained pus from the tube, ovary, or other viscus. 3. To remove fluid in cases of persistent capillary hemorrhage. 4. To provide against hemorrhage in cases of hysterectomy when the pedicle is dropped. 5. To drain the peritoneal cavity and starve out the disease in cases of chronic or tubercular peritonitis. The following objections to the insertion of drainage-tubes have been formulated by Welch: "1. They tend to remove bacteria which may have gotten into a wound from the bactericidal influence of the tissues and animal juices. 2. Bacteria may travel by continuous growth or in other ways down the sides of the drainage-tubes, and so penetrate into a wound which they otherwise would not enter. We have repeatedly been able to demonstrate this mode of entrance into a wound of the white staphylococcus found so commonly in the epidermis. The danger of leaving any part of the drainage-tube exposed to the air is too evident to require mention. 3. The changing of dressings necessitated by the presence of drainage-tubes increases in proportion to its frequency the chances of accidental infection. 4. The drainage-tube keeps asunder tissues which might otherwise immediately unite. 5. Its presence as a foreign body is an irritant and increases exudation. 6. The withdrawal of tubes left for any considerable time in wounds breaks up forming granulations—a circumstance which both prolongs the process of repair and opens the way for infection. Granulation tissue is an obstacle to the invasion of pathogenic bacteria from the surface, as has been proved by experiment. 7. After the removal of the tube there is left a track prone to suppurate and often slow in healing." To these Halsted has added: 8. "Tissues which have been exposed to the drainage-tube are suffering from an insult which more or less impairs their vitality and hence their ability to destroy or inhibit organisms."

But beside increasing the chances of infection, drainage not infrequently gives rise to various post-operative complications. Of these Clark mentions: 1. Obstruction of the bowel. 2. Fecal fistulæ. 3. Vesical complications. 4. Post-operative herniæ. It is a well-known fact, and one proved by the most conclusive experiments, that under normal conditions the peritoneum can dispose of pyogenic organisms in no inconsiderable quantities without the occurrence of peritonitis. Nor must it be forgotten that drainage does not by any means always remove all foreign fluids and infectious matter, so that in not a few cases its employment will offer all the many disadvantages referred to above without accomplishing the main object. Clark has noted that the introduction of drainage material handicaps the peritoneum in three ways: 1. The normal peritoneal currents are disturbed, consequently the circulation of fluids and foreign matter toward the diaphragm is retarded. 2. A reactive inflammation is set up about the drain, limiting and impeding the action of the peritoneum. 3. Within a few hours the general peritoneum is cut off from all participation in the work of absorption by the wall of adhesions around the drain. In place of the natural agencies the work is thrown upon an agent which at best can only remove the fluid from a small pocket.

When gauze is used it soon becomes choked by the serous or bloody fluid which fills up its meshes and quickly coagulates. A limited quantity of fluid will be removed during the first two hours, but after that the drain acts like a plug, by preventing the outflow of fluid, which then accumulates in the dependent pockets.

The methods for prevention or the removal of infective material without the employment of drainage may be summarized as follows: 1. A thoroughly aseptic technique. 2. The controlling of all hemorrhage and oozing as far as possible. 3. Careful manipulation, so that all unnecessary bruising of the tissues is avoided. 4. A perfect toilet of the peritoneal cavity. 5. The removal as far as possible of infectious foci. 6. The use of irrigations with salt solution. 7. If necessary the reopening and thorough cleansing of the cavity. 8. Proper after-care of the patient. The author states that he has used drainage only once in 222 consecutive cases, and in this case the only reason that it was used was that there was a large pus sac present, communicating with the vagina and peritoneal cavity, which it was impossible to remove. In the author's two series of 222 cases, he reports finding pus in 65, or 28 per cent. After a wide experience before 1893, with drainage, and practically not having used it since then, the author believes that patients, as a rule, do very much better if drainage is not used. Not only have the immediate results been better, but the ultimate results, such as the occurrence of hernia and intestinal adhesions, have been avoided.

The Treatment of Abdominal Aortic Aneurism by a Preliminary Exploratory Cœliotomy and Peritoneal Exclusion of the Sac, followed at a Later Sitting by Wiring and Electrolysis.—MATAS (*American Medicine*, June 29, 1901) states that of the fifteen reported cases treated by this method all but three have died. A careful examination of the histories of these three cured cases tends to bear out the conclusion that aneurisms which originated low down on the abdominal aortic tract, especially below the superior mesenteric, all other conditions being equal, are much more favorable for attack by this method than those seated higher up in the cœliac area. The objections to this method of treatment are: 1. The cure of the aneurism may lead to the death of the patient by obliterating the orifice of important visceral arteries. This is most likely to occur in dealing with aneurisms of the upper or cœliac division of the abdominal aortic tract—*i. e.*, in about 50 per cent. of the cases. 2. Secondary rupture of the sac from the strain put upon weak portions of the sac in multilocular aneurisms after partial coagulation of the contents has taken place is particularly likely to occur in subjects of general endarteritis with atheroma. 3. Escape of wire through a large aneurismal orifice into the lumen of the aorta, with migration upward into the heart, leading to perforation, traumatic endarteritis, endocarditis, with the formation of secondary thrombi and emboli. 4. Danger of perforating the sac by stiff wire or by overcrowding the sac with too much wire. 5. Danger of extension of clot from the coagulum in the aneurism to the main artery, leading to fatal blockade at the bifurcation, with gangrene of the lower extremities. 6. Danger of rupture of sac from sudden withdrawal of abdominal support and displacement of adherent organs in the course of the exploratory laparotomy. 7. Danger of mistaking a fusiform for a sacciform aneurism. 8. Danger from emboli and thrombi following incomplete coagulation of the blood in the sac (a very rare and practically unknown occurrence in abdominal cases). 9. Danger of shock. 10. Danger of sepsis. In the presence of this formidable array of dangers which beset the application of this method, one must ask what are the conditions, if any, which are favorable to its successful application? Theoretically possible, but clinically rare, are the following conditions: (1) The aneurism should be saccular; (2) it should be unilocular; (3) it should be provided with fairly strong, resisting walls; (4) the patient should be young or middle-aged, fairly healthy, and free from general endarteritis and atheroma; (5) the aneurismal orifice communicating the sac with the lumen of the parent artery should be small; (6) the aneurismal sac should spring from the lower, inframesenteric division of the artery, preferably between the origin of the superior mesenteric and the bifurcation; (7) if given off from the cœliac region the orifice should be situated on the posterior or lateral wall of the aorta. With these ideal conditions, and with a perfect technique, the chances of permanent cure would be immensely increased and the operation could be undertaken with great probability, almost certainty, of success. But as the most important of these conditions can never be ascertained *intra vitam*, and one is thus unable to differentiate clinically between the favorable and the unfavorable cases, the author is forced to conclude that the Moore-Corradi method as at present applied, and in spite of the undoubted improvements that have been made in its technique, is a most dangerous procedure, essentially lacking in the elements of that scientific precision and knowledge of avoidable perils which are necessary to elevate it out of the plane of empiricism and surgical experimentation. Its chief recommendation now rests upon the naked fact that in three out of fifteen recorded cases (20 per cent.), it has actually arrested the progress of aneurisms and saved life. Apart from this clinical fact, it can claim but little else in its favor except that in the presence of almost certain death from the disease when allowed to follow its natural evolution, even a remote possibility of survival by operation is better than no chance at all.

The author states in conclusion that in the light of present experience we should restrict our recommendation of the combined method to that small group of comparatively favorable cases in which the aneurisms are confined to the inframesenteric portion of the aorta, and then only after other safer methods of treatment had been tried and failed. In aneurisms situated in the upper part of the aortic tract, the boundaries of which cannot be even approximately determined, the author regards this procedure in the light of a pure experiment—a veritable surgical adventure—which would be justified solely by the imminent danger of death from rapid progress of the disease which threatened rupture of the sac, and associated with great suffering. Even then the operation could not be recommended, but should be undertaken solely at the urgent solicitation of the patient after a thorough understanding that the chances would be no less than 70 per cent. against his recovery from the operation.

A Report of Twenty four Operations Performed during Spinal Analgesia.—BAINBRIDGE (*Medical News*, May 4, 1901), after reporting in detail the results of twenty-four cases, states that the following conclusions are made from fifty cases, which include those just noted: 1. Cocaine is far more satisfactory than eucaine. The latter is less potent, more evanescent, the areas of analgesia are frequently "patchy," having the pain sense retained all around them and not being so complete below definite levels. The cocaine produces no more unpleasant after-effects than eucaine, and is decidedly more reliable. 2. Analgesia to the level of the diaphragm can be depended upon in all cases where a moderate dose of a potent solution of cocaine has been introduced by lumbar puncture. In some the analgesia is sufficient for operation on the upper extremities. 3. Complete analgesia, including the eyes, mouth, and throat, has occurred. It does not entail more severe after-effects than when the lower extremities only are involved. 4. The preparation of the patient as for a general anæsthetic diminishes all the unpleasant effects of cocaine and eucaine, and often prevents them altogether. 5. By moderate doses of bromides before the injection the initial vomiting is frequently avoided and the liability of headache lessened.

6. In neurotic patients there are often hysterical symptoms directly following the completion of the injection; but, as a rule, in a few moments a calm follows and the patient lies perfectly still. 7. Initial nausea and vomiting often occur soon after the puncture, but last only for a moment or two, and usually do not recur during the operation. As consciousness, as well as the muscular power, is preserved, the danger of the introduction of the vomitus into the lungs is practically *nil*. 8. Analgesia lasts from thirty minutes to four hours. 9. Depression after the puncture is considerable. The use of ethyl chloride (Bengue) largely prevents pain when the needle is introduced. 10. The preparation of the patient, the use of nitroglycerin by hypodermic injection, or the employment of coal-tar products with caffeine, control the headache, which is in many instances an after-effect of spinal puncture. 11. In a few cases there may be motor paraplegia or vertigo. Both are temporary. 12. Spinal puncture has not affected normal or diseased kidneys. 13. Usually the tactile power, muscular sense, and the ability to detect heat and cold are retained. The cautery at a dull red heat causes no pain, while hot water produces marked discomfort. 14. Usually the patient sleeps the first night. 15. There is often a temperature of a few degrees within eight or ten hours of the operation. Whether this is the direct result of the puncture or the effect of psychic disturbances is not determined. The circulation and respiration are not seriously embarrassed.

The Diagnosis and Surgical Treatment of Renal Tuberculosis.—BROWN (*Boston Medical and Surgical Journal*, May 30, 1901) states that for obvious reasons, in this malady, no one can speak authoritatively, either as to the final results of supposed radical surgical treatment, or, on the other hand, as to the certain progress toward a fatal termination of all cases which are not treated in some way. Despite the immense amount accomplished by earnest labor in the field of tuberculosis, one must hope that something more specifically curative than the knife, sanitation, or the piney woods may soon be discovered. In other localizations of the disease the importance of early diagnosis has long been appreciated; but when the kidney is involved, recognition of the fact is apt to be unfortunately tardy. In all cases of pyelitis, nephritis, and cystitis the etiology should be determined or at least most diligently sought for. In order to secure more satisfactory results from surgical treatment, renal tuberculosis must be detected in anticipation of rather than long after the objective symptoms have become so conspicuous as not alone to render differentiation of the urine difficult, but to have involved so much of other parts of the urinary tract as to preclude a radical operation. Urinary analysis in general should mean as careful a routine search for tubercle bacilli as is customarily given to the other formed elements of a sediment. There are cases of renal tuberculosis where the lesions are not in open communication with the urinary channels, hence the microorganism is not possibly attainable for microscopical or inoculation evidence. It is not so very unusual for an open tuberculosis renal lesion to shed so few bacilli that persistent microscopical search fails to find them. Here animal inoculation should always be early resorted to. Sometimes the subjective symptoms are quite pronounced, even in the early stages of the disease; in other cases the pains are little noticed in advanced stages of the trouble, except by the behavior of the bladder, and too often these vesical symptoms are cited as evidence that this viscus is the original and only seat of the trouble. A dull aching in the lumbar region is significant; equally so is a much more acute kind of pain referable to the kidney or ureter. When these occur as crises, associated with nausea and vomiting, renal calculus or gravel colic is most apt to be thought of. So many cases give a history of having had systemic manifestations resembling mild malaria, that they seem as not infrequent precursors to the more distinctly localized later symptoms. Often the first symptom is increased frequency of urination, but in the majority of cases this does not appear until the lower segment of the ureter has either acquired a genuine tuberculous lesion or at any rate marked hyperæmia and œdema have developed, with irritation around the mouth of the ureter. The principal objective symptoms are a kidney which is larger and more tender than normal, as well as all grades of pyuria and hæmaturia, beside a just appreciable or a very marked diurnal variation in temperature; loss of color and weight; a reaction to tuberculin; finally, the presence of tubercle bacilli in the urine derived directly from one or both kidneys. The author believes that the injection of tuberculin is valuable as an aid to diagnosis in doubtful cases. The mortality of nephrectomy for tuberculosis is low, averaging from 5 to 7 per cent. The incision varies, but the operation should be performed by the extraperitoneal route.

During a nephrectomy for renal tuberculosis, if the disease is seen to extend down the ureter to a point below the first sacral vertebra, the author does not urge that a total extirpation should then, or even at a later operation, be done. Several of his observations tend to the inference that a considerable amount of tuberculous ureter can be left with comparative safety; because, now being in a functionless state of repose, this particular focus is amenable to curative systemic processes. At the same time sufficient experience has not been accumulated to assert that a routine practice based on this presumption is always the best surgery. If total removal did not necessitate such an increased operative exposure, the radical step would better satisfy the surgical indications here just as well as in dealing with any tuberculosis. If it were thoroughly ascertained that a ureter was diseased from kidney to bladder, and the operator felt inclined to do a total extirpation or none, it might improve the patient's chances to have a primary ureterectomy of the lower half, while the proximal end of the tube was given a temporary cutaneous implantation, there to drain the kidney until an early favorable time for nephrectomy. In this order the services of both kidneys would be available for convalescence from one operation. Even in cases presenting tuberculous vesical lesions where only one kidney is similarly diseased, the author thinks that nephrectomy is indicated in a certain number of such individuals as offering the best chances for extension of life and comfort. Every reasonable effort should be made to determine the condition of each kidney before any operation is done for the relief of vesical symptoms, because nothing can be gained by this latter step so long as tuberculous débris is coming into it from above. The author states in conclusion that too great pains cannot be taken by physician and surgeon to determine the location and extent of the disease before determining upon the treatment. The integrity of the other kidney, of course, has great bearing on the surgical aspects of any case. To determine in any particular case just what rate of progress the disease may pursue if left untreated, or what degree of immunity from some of the annoying symptoms we can promise the patient by nephrectomy, is not easy. In ward hospital cases the immediate operation appears to be the only alternative. For those who can afford climatic changes and rest a careful preliminary observation of the existing conditions of the urinary tracts should precede their travels, and the same examination, when at all indicated, should be repeated in order to keep posted regarding such an advance of the disease as to call for operation.

Orchitis and Epididymitis in Typhoid Fever.—KINNICUTT (*New York Medical Record*, May 25, 1901) reports two cases of this rare sequel or complication of typhoid fever. Eshner, in 1898, after a careful review of the literature, was able to collect only 44 cases, and Do collected the statistics of complications occurring in 14,738 cases of typhoid fever without finding a single case of orchitis and epididymitis. In Osler's series of 829 cases of typhoid fever, orchitis or epididymitis was observed only in 2 instances, both unattended with suppuration, and in the 889 cases treated by the author and his colleagues in the Presbyterian Hospital the lesion was noted only in the two cases which the author reports. It is probable that the frequency of this complication is greater than the statistics indicate. Aside from cases which presumab'y have not been reported, the fact that in the 44 cases collected by Eshner, 5 occurred after the second week of convalescence—one of these, as late as the ninth week—suggests the presumption that cases occur in which the true origin of the orchitis is not suspected. The first case, aged twenty-four years, was admitted to the hospital on the seventh day of his illness. The infection was of a moderately mild type, the maximum temperature not exceeding 104.5° F. He was treated by the cold bath, and the illness was in every way uneventful. The morning and evening temperatures were normal on the twenty-third day. There was a marked increase in the leucocytes on the fifteenth day, which lasted for three days, and then gradually disappeared. The urine was slightly albuminous, but at no time were casts found. The catheter was not used, and there was at no time any urethral discharge. There was no history nor evidence of gonorrhœal infection in the past. On the fifth day of normal temperature the patient complained of pain in the right groin and the temperature rose to 101°. Examination the next day showed that the cord was enlarged, hard, and sensitive in the inguinal canal. The following day the swelling had reached the external ring, and in the course of the succeeding twenty-four hours the morbid process had extended to the epididymis and testicle. These became markedly swollen and very sensitive. There was no effusion into the tunica vaginalis. Almost simultaneous with the swelling of the cord, phlebitis of the long saphenous vein developed. The swelling of the cord and testicle gradually subsided, and on the sixteenth day after the first appearance of the symptoms the only evidence consisted of a trifling induration and sensitiveness of the epididymis, sensitiveness along the course of the saphenous vein, and moderate swelling of the leg and thigh. When examined ten weeks later all physical signs of a lesion of cord, epididymis, and testicle were absent. The second case was thirty-four years of age, and developed orchitis and epididymitis at the end of the febrile period. Examination showed the seminal vesicles to be normal, the prostate enlarged but not tender, and some fluctuation over the testicle. Aspiration at the point of fluctuation was made, and a small quantity of pus obtained; this contained the typhoid bacillus in pure culture. The swelling and sensitiveness of the cord, testicle, and epididymis have only partially subsided, and there is still a sinus leading to the body of the testicle through which minute shreds of necrotic tissue are occasionally extruded.

In the fifty-three cases of testicular inflammation occurring in the course or during the convalescence of typhoid fever, which comprise the literature of the subject, suppuration developed in thirteen. Bacteriological examination demonstrated the presence of Eberth's bacillus in pure culture in the pus from six of the cases. In a single instance pyogenic cocci alone were found. The remaining six cases were reported prior to or about the date of Eberth's discovery of the specific bacillus of typhoid fever.

In one non-suppurative case Eberth's bacillus was found in pure culture in the sero-sanguinolent fluid obtained from an aseptic puncture of the testicle.

In view of the bacteriological findings, the usual origin of orchitic lesions in typhoid fever cannot be doubted. Apparently only exceptionally is the infection due to other micro-organisms than Eberth's bacillus. It remains to consider the probable channels of infection.

It is probable that the bacilli reach the testicle both by the blood stream and from the urethra through the intermediary of the vas deferens. That Eberth's bacillus in great numbers is found in the urine in a large percentage of cases of typhoid fever is now well known.

It may be of interest to analyze briefly Eshner's forty-four cases and the nine additional ones which the author is able to add, of orchitis and epididymitis occurring in the course or during the convalescence of typhoid fever, comprising all cases found in the literature of the subject which give sufficient detail to be of value.

Sixteen cases developed during the course of the fever. Of these, one occurred during the second week, six during the third week, two during the fourth week, one during the fifth week, one during the sixth week, two during the seventh week, two "at defervescence," and one at a time not definitely stated. Thirty-five cases developed during convalescence. Of these, eleven developed during the first week, seven during the second week, three during the third week, one during the fourth week, one during the fifth week, one during the sixth week, eleven at a time not definitely stated. In two cases the date of development is not given. In two cases the inflammation affected both sides, in forty-five it was unilateral, and in six cases no statement is made of its localization. Of the unilateral cases, twenty-two were on the right side, twenty-one on the left, and in the remaining two it is not stated on which side. The epididymis only was involved in seven cases; the testicle only in sixteen cases; both epididymis and testicle in twenty-six cases; and in the remaining four a distinction is not made between the testis proper and the epididymis. There was effusion into the tunica vaginalis in nine cases; in ten, it is noted that such effusion was absent; and in thirty-four no statement is made on this point.

Suppuration occurred in thirteen cases, partial necrosis in five cases, complete necrosis in two cases, and death in two cases, but without apparent relation to the complication. Recovery with residual nodules in the epididymis is noted in seventeen cases; the subsequent histories of these cases would be of interest. The bacteriological examinations of the pus in the suppurating cases have been given earlier in this paper.

A study of these cases justifies the following conclusions: 1. Epididymitis or orchitis occurring in the course or during the convalescence of typhoid fever is a rare lesion and is of typhoidal origin. 2. Only very exceptionally it is due to secondary microbic infection. 3. It develops at a late period in the disease or during convalescence. 4. The lesion, although as a rule unilateral, may be bilateral, and involves either the epididymis or testicle or both, and not infrequently the cord. 5. Effusion into the tunica vaginalis is rare. 6. Termination most often is by resolution. 7. Suppuration occurs in 25 per cent. of all cases. 8. Localized necrosis and extrusion of testicular tissue is not uncommon. 9. Exceptionally there is destruction of the entire testicular structures. 10. Atrophy of the testicle occurs, but is a rare sequence. 11. The lesion gives rise to little constitutional disturbance. 12. Death as a direct result of the lesion has not been noted.

Notes on 206 Operations for Stone.—ADAMS (*British Medical Journal*, May 25, 1901) states that the operation of choice is lithotrity unless one of the following contraindications prevents: In boys (1) when there is marked cystitis, lithotomy drains the bladder and cures both diseases; (2) when there is much difficulty in passing instruments; (3) when the stone is too large or hard for the necessarily small lithotrite; (4) when there are indications of advanced kidney disease or great debility, the shock of the cutting operation seems less severe, probably because it is briefer. In men (1) when the instruments cannot be passed; (2) when the stone is too large or cannot be grasped. The author has never found a stone too hard. A former operation often renders the introduction of instruments difficult. Lithotrity was successful in the smallest boys. Forty-eight cases were in boys under ten years of age. Only one death occurred in a boy, aged three and one-half years, whose bladder was full of calculi, weighing in all seven drachms. Fifteen of these cases were in children under three years of age, and all did well. Three of the thirty-six cases of lithotomy and three of the 161 cases of lithotrity died. The author concludes with this brief table of cases: With calculi extracted through the meatus, 4; urethral calculi extracted by external urethrotomy, 2; vesical calculi removed by lithotrity (males, 153; females, 8), 161; vesical calculi removed by perineal lithotomy, 36.

The Surgery of Gastric Ulcer.—ANDREWS (*Chicago Medical Recorder*, May, 1901) states in conclusion: (1) Gastric ulcer is a surgical disease; (2) perforating ulcer should be treated by laparotomy as early as possible; (3) bleeding gastric ulcer should be treated by operation after resisting medical treatment; (4) gastric ulcers produce and are also caused by pyloric obstruction, and this calls for operation. Many obscure and obstinate stomach troubles are caused by this cicatricial obstruction, and can be cured very safely by surgical intervention.

THERAPEUTICS.

UNDER THE CHARGE OF
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Treatment of Tuberculosis by Climate.—DR. C. THEODORE WILLIAMS opened the discussion on this subject at the recent British Congress on Tuberculosis. The main points at issue are: (1) What influence has climate on the treatment of tuberculosis? and (2) how far can cases be grouped for treatment in certain climates? Both of these questions he discussed very fully. The belief that has existed in all ages that the disease is curable by climate is, he thinks, justified by the results of such treatment. Under what climatic conditions, he asks, is arrest of the disease most common? What are the real causes of such improvement, and how can they be successfully brought into play? In all climatic treatment, of course, care must be taken to bring the patient fully under the influence of the atmosphere, and to ensure a strictly open-air life by day and by night, with complete hygienic and sanitary surroundings, whether in a sanitarium or elsewhere. But all climates favoring an open-air life are not necessarily suitable for the treatment of consumption; tropical lands must be excluded, because there the appetite is diminished, the nervous and muscular energy depressed, excessive action from the skin induced, and requisite exercise prevented. Bacillary increase is probably also favored. Very moist climates and those in which the sun is often obscured by mist and fog, even though mild, are undesirable, as sunshine is of the greatest importance to the consumptive. The climate which best fulfils the conditions for open-air treatment need not be a very warm nor a very cold one, but should be dry and stimulating, with abundant sunshine, admitting of much exercise and producing nervous and muscular vigor. Climates, he said, must first be classified before they are described, and though it would be possible to arrange them scientifically on the basis of meteorology, as attempted in the Lumleian lectures before the College of Physicians, for the purposes of this discussion a few practical groups will be preferable. These are (1) marine climates; (2) dry, warm climates, partly inland and partly marine; (3) mountain climates. Marine climates include (*a*) the British and Irish seacoast resorts; (*b*) the warm marine climates of Madeira, Teneriffe, and the West Indies; (*c*) sea voyages. Dry, warm climates, the desert climates, and those of the Mediterranean basin, differing in many particulars, but both characterized by warmth and dryness. Mountain climates, characterized by the influence of diminished barometric pressure. The climates discussed were those more easily reached from England. He spoke particularly in praise of extended sea voyages, especially voyages to Australia and New Zealand and around the Cape of Good Hope in clipper ships. They are most beneficial (1) in cases of hemorrhagic phthisis where large hemorrhage accompanies small areas of tuberculization; (2) in scrofulous or strumous phthisis, where lung disease is accompanied by strumous gland or joint affections; (3) in cases of chronic cavity, where the tuberculous disease is unilateral and quiescent. To ensure the success of a sea voyage the patient must be certain of (1) good and abundant food; (2) proper cabin ventilation; also (3) that the cruise be principally in temperate climes and not in tropical. Of the dry, warm climes the Egyptian desert is highly recommended. With reference to the Riviera, the cases which do best are (1) phthisis in which inflammatory processes have played a large part in predisposing to the disease; (2) strumous phthisis; (3) laryngeal phthisis; (4) unilateral pulmonary tuberculization rather than bilateral; (5) the large class of consumptives who either from extent of disease or feebleness of circulation, or advancing years, are unable to endure the rarefied atmosphere and cold of the high altitudes. Most of these patients love warmth, and cannot take enough exercise when the thermometer is below zero to maintain it. With reference to mountain climates, his conclusions were as follows: 1. The respiration of the rarefied atmosphere produces hypertrophy of the healthy lung and local pulmonary emphysema around the tuberculous lesions, giving rise in due time to thoracic enlargement. 2. It is possible the arrest of tuberculous disease is at least partly due to the pressure exercised in the tuberculous masses by the increasing bulk of the surrounding lung tissue, which, by emptying the bloodvessels, promotes caseation and cretefication of the tubercle. 3. These changes are accompanied by general improvement in digestion and assimilation, the cessation of all symptoms of disease, the return of natural functions, by gain of weight, of color, of nervous and muscular activity, and of respiratory and circulatory power. 4. Arrest of disease takes place in 58 per cent. of the tuberculization cases, and great improvement in 87 per cent. In excavation cases arrest occurs in 21 per cent. and great improvement in 61 per cent. 5. The climate is especially beneficial in hemorrhagic phthisis and phthisis in which hereditary predisposition is strongly marked, and is well suited to chronic tuberculosis of the lungs in general, provided the extent of lung involved is not too large nor the disease accompanied by much fever. 6. Males and females seem to do equally well and to profit most between the ages of twenty and thirty. Males over forty and females under twenty benefit least. 7. The climate is contraindicated in acute phthisis, catarrhal phthisis, in laryngeal phthisis, in cases of phthisis accompanied by great nervous irritability in patients with double cavities, with fibroid phthisis, and in all patients whose pulmonary surface has been so much reduced from any cause that it does not suffice for complete respiratory purposes.—*British Medical Journal*, 1901, No. 2117, p. 198.

Classification of Cases of Tuberculosis and Climatic Treatment.—DR. BURNEY YEO discussed this subject in an able manner. He said that the main objects of treatment in pulmonary tuberculosis are (*a*) to arrest catarrhal conditions of the air-passages; (*b*) to improve nervous and circulatory tone; (*c*) to increase the activity of the digestive functions, and thus stimulate nutrition by promoting the desire and increasing the power to take exercise; (*d*) to raise the moral tone—by no means an unimportant matter—by affording a clear, bright, and cheerful environment; (*e*) to diminish by its asepticity bacterial activity. It must be a question for consideration whether the so-called "open-air treatment," without regard to suitable climatic conditions, will do all this. It should be the object, when practicable, to place the consumptive patient under conditions and in circumstances where, without risk or injury, he may obtain the most complete and perfect aeration of the lungs possible. The difficulties in the way of finding suitable abiding places for the tuberculous were pointed out, and Dr. Yeo cited some marvellous "cures" which occurred in patients who never left London. Many chronic stationary cases with fair general health travel about to different winter resorts with successive seasons, and take no harm in doing so. The answer to the first part of the question, he suggests, will be that a suitable climate (*a*) relieves or removes the catarrhal conditions accompanying the disease in a number of cases; (*b*) it raises nervous and vascular tone; (*c*) it increases muscular energy and the ability as well as the desire for exercise; (*d*) by rendering an open-air life possible it increases the aëration of the lungs and diminishes the activity of the bacterial agencies, one of the most essential conditions of arrest and cure of the disease; (*e*) it improves the tone and promotes the activity of the digestive functions, and so enables the patient to take the large amount of food which is needed to heighten his state of nutrition; (*f*) and, finally, it improves the moral and mental state by surrounding the patient with a bright, cheerful, and hopeful environment. Then, as the answer to the second part of the question, he says: 1. Cases seen at the very commencement of the disease, and which are otherwise in good health, may be permitted a certain amount of choice in the selection of a climate, provided it allows of many hours being spent daily in the open air, and that they are placed under admittedly hygienic conditions. A choice may be made from climates of altitude, the desert climate, the inland plateaux of South Africa, the sea voyage for those with a decided liking for the sea, and suitably placed sanatoria. 2. For progressive febrile cases, repose in bed or on a couch at home, in the best conditions practicable for the free access of air and sunshine to their apartments. 3. For advanced cases home is best if the conditions of home-life are favorable, or the warm marine climates, with cheerful surroundings, if home life is unfavorable or change is urgently desired. 4. For catarrhal cases warm, soothing climates, like Madeira or Teneriffe, are best. 5. For rheumatic or gouty cases of the fibroid or pleurogenic type—dry, marine climates or the desert climate are most suitable. 6. For the so-called "scrofulous cases," if free from catarrh, fairly bracing marine climates; if with catarrh, mild marine climates should be prescribed. 7. For most other moderately advanced cases, with the limitations already mentioned, the climate of the high mountains, above the cloud belts, is the most curative.—*British Medical Journal*, 1901, No. 2117, p. 202.

Treatment of Cholera Infantum.—Dr. W. Blair Stewart states that climatology and diet are two of the most important features in the treatment of cholera infantum. If the means of the patient will afford it, send the child from the close room to the seashore, to live in the open air. Sea air with slight assistance from medicines will work many cures in apparently hopeless cases. The earlier in the attack the child is sent to Atlantic City or to other healthful seaside resort the greater its chance of recovery. If circumstances do not permit of such a trip, place the child in the coolest room of the house, where free ventilation can be obtained; or, what is much better, on a cool porch. Do not nurse the child in the arms, but place it on a cool, solid bed, where all motion can be avoided. Never rock the child in a cradle. Always starve these patients the first twelve to thirty-six hours. If the child is breast-fed do not allow too frequent nor too prolonged nursing. This class of patients is the easiest to manage. In bottle-fed babies you will have your troubles. After the preliminary fast begin with teaspoonful doses of barley, albumin, or toast-water, and as this is well retained add small quantities of the best pure fresh milk mixed with lime-water until the normal feedings can be borne. Many times it may be necessary to resort to some good prepared food in very small quantities where milk is not tolerated in raw or predigested form. Try a weak lamb, mutton, or beef broth (absolutely free from grease and pepper) at first, and gradually add to this pure expressed beef juice, always watching to avoid too frequent or overfeeding. Do not try solid foods in older children until several days after all symptoms have subsided. These are good general rules or outlines of treatment, subject to change in each case. Their neglect will usually lead you into trouble. Make an exhaustive physical and dietetic study of each case, and remember that elimination is first, diet is second, hygiene and change of air third, and antiseptics and astringents are last in therapeutic importance.—*International Medical Magazine*, 1901, vol. x. p. 389.

Atropine in Ileus —Much literature has recently been published concerning the life-saving properties of atropine in desperate cases of intestinal obstruction of various kinds. DR. H. GEBELE raises a warning cry against the too free use of this remedy, since it too often obscures the clinical picture, and, far from being infallible, it prevents the surgeon from selecting the proper moment for operation. It is only in the paralytic or spastic form of obstruction that internal treatment has any effect, and here small doses of morphine have the same effect as atropine, and are to be preferred. In mechanical obstruction atropine is still less indicated, and gastric lavage, enemata of several quarts of olive oil, or of castor oil, and, above all, operation must be resorted to.—*Münchener medicinische Wochenschrift*, 1901, No. 33, p. 1313.

Therapeutic Uses of Scopolamine Hydrobromate.—DR. M. ROSENFELD, working in the Psychiatric Clinic at Strassburg, finds that this drug has a decided action on the normal as well as the sick individual. Dosage depends largely on the age, condition, and strength of the patient, but on the average one two-hundredth to one one-hundredth grain, thrice daily, is sufficient. It acts as a strong sedative in the insane, and also in those with minor nervous disorders, as hysteria and neurasthenia. Certain by-effects, such as dryness of the skin, itching, slight dizziness, were noted, but should not be considered contraindications to its employment. It is essential to use fresh solutions, since a decomposition of the drug takes place in old preparations.

Injections are best borne immediately after eating, and, as no cumulative effects have been noted, may be continued for long periods of time.—*Therapie der Gegenwart*, 1901, vol. vii. p. 298.

Treatment of Chlorosis—DR. GUSTAV FUETTERER concludes a short study of this subject as follows: (1) That great attention should be given to the study of chlorosis clinically; that clinical observation should be controlled by taking the specific gravity of the blood; that a very energetic treatment, mainly with beef juice properly prepared, should be instituted at once and continued until the specific gravity of the blood has become normal; (2) that chlorosis or secondary anæmia in tuberculosis must receive the same consideration and treatment, no matter what other treatment may be employed; (3) that it is advisable to cause an artificial anæmia in animals to be inoculated with suspected tuberculous sputum, for diagnostic purposes, as a finer reaction will take place, and more accurate and probably quicker results can be expected; (4) that chlorosis in early years, or secondary anæmia in later years, allows a round ulcer of the stomach to form and prevents its healing, while the presence of a normal or nearly normal percentage of hæmoglobin brings prompt repair, and that, therefore, chlorosis or secondary anæmia, coexisting with round ulcer of the stomach, should receive our first attention before any so-called ulcer treatment is instituted. While a very high opinion of the effectiveness of a rest-cure in cases of ulcer of the stomach is to be entertained, a preparatory treatment with beef-juice brings much better results; (5) that therapeutic measures, as described in this paper, particularly fresh and properly prepared beef-juice, allow us to create a normal composition of the blood, both in chlorosis and in secondary anæmia, as a rule, in a very short time.—*Chicago Medical Recorder*, 1901, vol. xxi. p. 1.

Vioform—The many substitution-products of iodoform have not been able to leave a lasting impression, with the sole exception of vioform, says DR. D. KRECKE. It not only possesses the great advantage of iodoform, of keeping wounds absolutely dry and free from germs, but it is almost as great a specific as this in tuberculous processes, and lacks any disagreeable odor. Vioform is capable of replacing iodoform in all respects in rectal and vaginal surgery, as well as in operations about the mouth and other places where contamination of the wound surfaces is unavoidable. In tuberculous joints suppuration is apt to follow vioform injections, so that it is not recommended so highly here.—*Münchener medicinische Wochenschrift*, 1901, xlviii., No. 33, p. 1310.

Gelatin as a Hæmostatic.—The technique of the employment of gelatin for increasing the coagulability of blood is described by DR. J. SAILER as follows: The gelatin is prepared as for ordinary media, using, however, five to eight hundredths of 1 per cent. saline solutions instead of bouillon. Since the degree of pain experienced on injection seems to be proportionate to the amount of turbidity, it is important to thoroughly clarify the solution with white of egg. Sterilization is then accomplished by heating in an ordinary steam sterilizer fifteen minutes for three successive days. In regard to the strength of the solution, there seems to be considerable divergence of opinion. Generally, however, 5 to 10 per cent. solutions are employed locally, and 1 or 2 per cent. for subcutaneous injection. About ten ounces of the 1 per cent. solution are usually required. The preferred situations for injections are between the shoulder-blades, under the breast, and on the outer side of the thigh. They are indicated in all hemorrhages, such as hæmoptysis, hæmatemesis, metrorrhagia, melæna neonatorum, purpura, and the purpuric forms of the infectious diseases, and are contraindicated in only one condition, viz., acute nephritis.—*Therapeutic Gazette*, 1901, vol. xxv. p. 508.

Euchinine a Prophylactic in Malaria.—DR. A. MORI reports that euchinine in doses varying from four to eight grains a day is capable of preventing malaria in those not protected by living in mosquito-proof houses. It is advisable to begin treatment four or five months before the usual malarial season. He reports, further, that in a series of observations on eighty-nine individuals under similar circumstances that in forty-two who had been under treatment only five contracted malaria, while in forty-seven who were not so treated thirty-nine suffered. The five who contracted the disease had it in a mild form.—*Centralblatt für Bakteriologie*, 1901, No. 20, S. 786.

Sero-therapeutics of the Plague.—DR. JOHN BROWNLEE gives a series of personal experiences in the use of the Yersin plague serum in the recent cases at Glasgow. With reference to its prophylactic action, he says that this serum did not convey absolute immunity in the cases under observation, but that if the disease is established, after its use, it is liable to be much less severe. From the stand-point of its curative action he holds that the subcutaneous use of the serum is not of any great curative value.—*The Lancet*, 1901, vol. clxi. p. 435.

Treatment of Syphilis by Injections.—DR. M. STERN says that the disadvantages of the usual inunction treatment of syphilis are many. The most important are uncleanliness, inexact dosage, and the frequency with which the cure is interrupted by the patients themselves, the result being the present increase of tertiary and parasyphilitic affections. Injection, on the other hand, is convenient and easy of administration, rapid in action, and possesses the further advantage that the physician need not leave the greater part of the treatment to the discretion of the patient. In cases in which there is a diseased or senile skin the absorption of mercury is much diminished, and injections become a necessity; when a rapid diagnosis has to be made they are far superior to inunction. Concerning the use of insoluble or soluble mercurials opinions are divided, but the former possess the advantages that they have to be given less often, and that from six to ten injections generally suffice. The author has tried the various salts and combinations recommended, and finds that calomel generally causes too intense pain, while gray-oil injections are liable to be followed by infiltrations and abscesses. The best results have been obtained by him with sublimate.—*Münchener medicinische Wochenschrift*, 1901, vol. xlviii., S. 1084.

OBSTETRICS.

UNDER THE CHARGE OF

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Protargol in Ophthalmia Neonatorum.—Piotrowski (*Centralblatt für Gynäkologie*, 1901, No. 31) has employed protargol in varying solutions in a large number of cases for catarrh of the conjunctiva. The result of his experiments has been the adoption of the following method: Immediately after labor the lids are cleaned with 3 per cent. boric acid solution and the eyes thoroughly irrigated with 10 per cent. solution of protargol. Secondary catarrhs have not followed this practice, and it has proven thoroughly satisfactory.

Rupture of the Symphysis.—Ruth, from the clinic at Riga, reports in the *St. Petersburger Medicinische Wochenschrift*, 1901, No. 24, the case of a patient who had borne a child and gave a history of uninterrupted health. In her second labor she was attended by a midwife, who examined her without antiseptic precautions. As birth did not proceed, the midwife endeavored to pull out the head with her hands, and, failing in this, physicians were summoned, who delivered the child with much difficulty by the use of forceps. There was an extensive laceration and hemorrhage. The patient became septic, and in this condition was seen by Ruth.

On examination the bladder was found intact. The lacerations had not healed. An abscess was found behind the symphysis, and a fistula leading thence into the connective tissue of the pelvis. The symphysis had been ruptured extensively. The abscess was opened and drained, the patient freely stimulated, but succumbed to septic infection. At autopsy the septic process was independent of the rupture of the symphysis, and no direct connection could be traced between the abscess cavity and the joint.

Contributions to the Pathology of the Newborn.—In the *Comptes Rendus de la Société d'Obstétrique, de Gynecologie et de Pediatrie de Paris*, 1901, vol. iii., Porak and Katz report the case of an infant, about one month old, born in spontaneous labor, who had after birth intense icterus and failing respiration. Convulsions supervened, limited to the face and eyes. The child died in a convulsion. Upon examination an extensive cerebral hemorrhage limited to the right ventricle was found. It seemed most probable that an acute infection was the cause of the hemorrhage.

Softening of the cerebral hemisphere in a nursing infant was also observed in the case of a child born in the eighth month of pregnancy and delivered in an easy labor. The child had no symptoms pointing to cerebral disease, and seemed to perish from weakness. It lived thirty-six days after birth.

A congenital diaphragmatic hernia was reported by the same observers in a child born of a multipara strong and healthy. The child presented no apparent malformation, breathed badly, became rapidly cyanosed, and perished. It was noticed that the apex of the heart beat upon the right side instead of upon the left. In the left half of the chest there was resonance over a greatly distended intestine. Upon autopsy the left half of the chest was filled with the intestine. The left lobe of the liver was behind the costal cartilage. The stomach, duodenum, pancreas, and spleen were also within the thoracic cavity. This rare condition could not be traced to violence, and must be considered as a congenital malformation.

Fatal Poisoning with Bichloride of Mercury.—LA PAGE (*Comptes Rendus de la Société d'Obstétrique, de Gynecologie et de Pediatrie de Paris*, 1901, vol. iii.) reports the case of a woman who had an abortion and in whose case it was proposed to curette the uterus and douche it with a solution of carbolic acid. By mistake a strong solution of bichloride of mercury was allowed to run through a catheter into the uterus. The womb was at once washed out with sterile water and packed with gauze.

The patient speedily developed suppression of urine, mercurial diarrhœa, and delirium, and died. An autopsy could not be obtained. Before death she suffered greatly from irritability of the bladder, diarrhœa with tenesmus, and exceedingly fetid discharges.

[This case may serve as a reminder that bichloride of mercury is an unsafe substance to introduce within the uterus. In ordinary dilutions its employment has been followed by fatal absorption.]

Extra-uterine Fœtation.—MALCOLM (*British Medical Journal*, July 13, 1901) describes his experience in cases of extra-uterine fœtation. He draws attention to the fact that the fœtal bones may be retained for a long time with comparatively little injury, and describes the case of a patient upon whom he operated for ovarian tumor, removing at the same time the bones of a fœtus that had died seven years before. They lay between the ovarian cyst and adherent coils of small intestine, and could not be left. He compares the growing ovum to an ovarian tumor developing deeply between the folds of the broad ligament, and those anatomical relations which the operator will find are much the same in the two cases. As illustrating the obscurity of diagnosis with many of these patients, he describes the case of a woman, married twenty years and having two children, the younger eighteen years old. She had discharges from the uterus and irregularities of menstruation for fifteen or sixteen years. She had been seized with sudden illness some weeks before coming under observation. Upon examination a large mass was found in the pelvis, and when the febrile symptoms and pain abated a rounded tumor was found fixed in the hollow of the sacrum. Upon operation the mass was a collection of blood, due to the rupture of the Fallopian tube.

Rupture of the Uterus in a Multipara.—SIMPSON (*British Medical Journal*, July 13, 1901) reports the case of a woman, illegitimately pregnant, who was taken in labor when alone. When seen the patient was dying, the stump of the child's right arm was protruding from the vulva, and the forearm had been separated with a breakfast knife. The patient soon died.

Upon examination the child and placenta were found in the peritoneal cavity, with the exception of the stump of the right arm and the head. Rupture of the uterus four inches in length was found upon the left side, where the peritoneum was reflected to form the broad ligament.

The rupture probably occurred by vigorous movements of the fœtus occasioned by the mother, who cut off the forearm as it presented in a desperate attempt to conceal her illegitimate pregnancy. This caused a strong reflex action of the child, which plunged its feet through the uterine wall, rupturing the uterus and dragging the placenta with it.

Rupture of the Uterus in Placenta Prævia.—MAXWELL (*British Medical Journal*, July 13, 1901) recently reported before the Obstetrical Society of London three cases of rupture of the uterus in placenta prævia. In the first the woman died undelivered within a few minutes of the rupture. In the second the uterus was found ruptured posteriorly. After delivery the patient had dangerous hemorrhage, but recovered after gauze packing. The third case was as follows:

The patient was a primipara in poor health during pregnancy. She had weak uterine contractions, and the cervix dilated slowly. The edge of the placenta was felt posteriorly, and there was some hemorrhage. Labor passed by and returned fourteen days afterward, when free hemorrhage occurred, from which the membranes ruptured, the child's head coming down. Gentle pressure was made upon the uterus as the head descended. The child was born without assistance in ten minutes. Very free hemorrhage followed until the placenta was delivered and the uterus compressed. It was found that the bleeding came from a rent in the posterior wall of the uterus and cervix, and the fingers could be passed directly into Douglas' pouch. This rent was packed with gauze and pressure maintained upon the womb. The patient made a recovery without infection. The child weighed but five pounds, was puny, and died of pneumonia three weeks after birth. The placenta was marginal, and rupture had occurred through the entire cervix and lower portion of the placental site. These cases occurred in Chinese women.

In discussion the treatment was indorsed, and Herman expressed his doubt that the uterus is softened in placenta prævia as often asserted. Spencer had employed gauze packing in rupture of the uterus with success, and believed it much better than abdominal section and hysterectomy. Routh had seen one case of spontaneous rupture of the uterus with placenta prævia. The patient was eight months pregnant, and had several attacks of hemorrhage. Under deep anæsthesia the cervix was rigid, and it was not easy to insert the finger. An anterior marginal placenta was found. The tongue of the placenta was separated from the lower uterine segment, podalic version was performed, and the leg brought down and the child left for natural delivery. After twenty-four hours the child and placenta were spontaneously expelled. The patient became septic, and upon examination it was found that the uterus had ruptured anteriorly. The patient died. Horrocks had seen a most extensive rupture of the uterus treated by packing, which was renewed under chloroform every day for twelve days in succession, and then less frequently. The patient at last expelled a large slough from the right broad ligament, and ultimately recovered.

GYNECOLOGY.

UNDER THE CHARGE OF

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Primary Tuberculosis of the Genital Tract.—BERNHEIM (*La Gynécologie*, 1900, No. 5) in a paper on this subject summarizes as follows: 1. Tuberculosis of the genital tract in the female is not rare, as would be proved if a systematic bacteriological examination of all vaginal discharges were made. 2. The disease is most common in women between the ages of eighteen and thirty, although it has been observed in old women and infants. 3. Infection occurs during coitus, through the medium of foreign bodies, syphilitic lesions, etc., in an individual predisposed to the disease. 4. The tubes and ovaries are most often affected, less frequently the uterus, vagina and vulva. 5. Whenever a uterine trouble is not clearly of inflammatory origin, the possibility of tuberculosis should be borne in mind. 6. When other micro-organisms beside the tubercle bacillus are present and suppuration is probable, the only treatment is surgical.

Regeneration of Ovarian Tissue.—KANEL (*Wratch*, 1900, No. 13) examined ovaries of rabbits between two and three weeks after they had been subjected to mechanical and other injuries. His conclusions are as follows: 1. Aseptic wounds heal rapidly without the formation of granulation tissue, nor is there any evidence of local congestion and diapedesis such as usually accompanies the process of repair. 2. The primary healing is due to the activity of the epithelium of the medullary layer. 3. Lesions due to irritation of the ovary with turpentine result in the formation of cicatricial tissue which develops from the fibrous tissue of the stroma. 4. Infection with the staphylococcus albus is accompanied by extensive formation of granulation tissue and necrosis, with the subsequent appearance of a large cicatrix.

Prognosis and Treatment of Uterine Fibromyoma.—TORRE (*La Gynécologie*, 1900, No. 5), in a paper read before the last International Medical Congress, concludes that uterine fibroids are to be regarded as purely benign in character, their seriousness being due only to the changes which they may undergo and to the clinical symptoms. Normal pregnancy and parturition are often possible in a myomatous uterus, hence the attempt should always be made to spare the organ if possible.

In the absence of symptoms there is no indication for treatment. Hysterectomy is a last resort, to be confined to cases in which no other treatment is practicable. It is irrational to adopt this course in every instance.

CULLEN (*Ibid.*), in discussing the same subject before the Congress, calls attention to the fact that when the tubes and ovaries are healthy the endometrium is normal, and, on the other hand, the uterine mucosa is diseased when there are morbid changes in the adnexa. He is strongly in favor of preserving a portion of the uterus, even when large tumors were removed, and prefers the vaginal route in every case. Ligation of the uterine arteries he regards as an unscientific procedure on account of their free anastomosis with the ovarian arteries.

Methylene Blue in the Treatment of Endometritis.—CHALEIX-VIVIE and KOHLER (*La Gynécologie*, 1900, No. 5), as the result of a series of clinical experiments with methylene blue, pure, in concentrated solution and in the form of powder, affirm that it is a valuable remedy in cases of uterine hemorrhage and leucorrhœa, and has a marked analgesic action in dysmenorrhœa associated with disease of the endometrium. It is also useful in cases of disease of the adnexa and old hæmatoceles. Its bactericidal action has been proved by numerous experiments.

Intraperitoneal Shortening of the Round Ligaments.—SCHWARTZ (*Transactions of the Thirteenth International Medical Congress*) prefers this method to hysteropexy, although nine out of sixty-three patients on whom he performed the latter operation subsequently bore children. He regards it as a more scientific procedure, less apt to be followed by trouble during pregnancy and parturition.

STANKIEWICZ (*Ibid.*) believes that every case of retroflexion during the period of sexual activity should be treated, preferably by pessaries, though he notes only three cures in 109 cases. Surgical intervention offers the best prospect of a permanent cure. He prefers the method of intravaginal shortening of the round ligaments, recommended by Bode and Wertheim, with some modifications. In twenty-seven cases 87.5 per cent. were successful. The advantages over the Alexander operation are: 1. The avoidance of hernia. 2. Both ligaments may be shortened through a single incision. 3. The ligaments can invariably be found. 4. The method is applicable to cases of adherent retroflexion. 5. Diseased adnexa can be treated at the same time. 6. The results are entirely satisfactory. 7. There is no visible cicatrix or subsequent pain.

Ligation of the Uterine Arteries in the Treatment of Uterine Fibroids.—GOTTSCHALK (*Transactions of the Thirteenth International Medical Congress*) reports the ultimate results of this operation in his practice, extending over a period of twenty-two years. In all but three cases the results were satisfactory. His technique is briefly as follows: After separating the cervix, as in the first step of vaginal hysterectomy, he ligates the base of each broad ligament, using three or four ligatures of strong silk. The operation is followed by no reaction, even in the case of weak and exsanguinated patients who could not survive a radical procedure. It is especially recommended as a palliative measure in cases of profuse hemorrhage, but they must be carefully selected. The most favorable are those of interstitial tumors in the lower or middle segment of the uterus, those at the fundus being less amenable to this treatment, while the intraligamentary variety is entirely unsuitable. The tumor should not exceed in size the fœtal head at term. The nearer the menopause the better is the prospect of a permanent cure. If the patient's history and symptoms point to a previous attack of peritonitis, with resulting vascular adhesions, the prognosis after ligation of the uterine arteries is uncertain.

Treatment of Cancer of the Uterus.—BOUILLY (*La Gynécologie*, 1900, No. 5) concludes a paper on this subject, with the statement that in his opinion abdominal hysterectomy for cancer of the uterus will continue to be employed in a few carefully selected cases in which it is desirable to remove some of the most accessible lymph nodes. Vaginal hysterectomy should be practised in cases in which the disease is limited and the operation easy, or when the patient is old or unusually stout. Neither of the operations is to be regarded as of positive value, though a few positive cures have been recorded. Curettement is of great benefit in cases that are unsuitable for a radical operation.

Etiology of Cancer.—LEOPOLD (*La Gynécologie*, 1900, No. 5) concludes from a series of experiments that pure cultures of blastomycetes may be found in fresh cancer of the ovary. After injecting this culture into the testicle of a rat it soon died, and its peritoneum was found to be studded with nodules in which were masses of blastomycetes, which in their turn furnished pure cultures. Hence the inference that these may be the cause of malignant disease in man and are capable of inoculation in the lower animals, causing the development of similar growths.

Shortening the Round Ligaments.— EBERLIN (*La Gynécologie*, 1900, No. 5) believes, as the result of his own and others' observations, that this operation is the most rational one yet devised for the cure of movable retroflexion, and that with a proper technique it is invariably successful. The only way to certainly find the ligament is to open the inguinal canal.

Pregnancy and parturition do not affect the ultimate result, nor is there any danger of hernia when the different layers of the wound are accurately sutured. In order to avoid this complication and to insure success it is highly important to strip back the peritoneum at the internal ring.

Large Dermoid Cyst in a Child.—MCKEE (*University Medical Magazine; Frauenarzt*, April 19, 1901) reports the case of an immense abdominal tumor in a girl, aged seven years, which, on account of its rapid growth, shape, consistence and location (in the left renal region), was considered to be a sarcoma of the kidney. At the operation a large kidney-shaped dermoid cyst of the left ovary was found.

The reporter concludes that in a case of large abdominal tumor in a young child the possibility of ovarian dermoid should be borne in mind. The diagnosis will be aided by examination under anæsthesia or an X-ray picture. An explorative incision is indicated.

Origin of Dermoid Cysts of the Ovary.—Bandler (*Archiv für Gynäkologie,* Band lxi., Heft 3) concludes an elaborate paper by affirming that he has no doubt that ovarian dermoids originate from the Wolffian body and duct, as do some other cysts of the ovary and broad ligament. All the glandular structures spring from the included ectoderm. No real trace of an organ is ever found, and what has been described as gliomatous tissue, if it is really such, is only a product of the ectoderm.

Tenotomy of the Sphincter Ani in Perineorrhapy.—Fritsch (*Centralblatt für Gynäkologie,* 1901, No. 2) formerly used a piece of rubber tubing to allow the escape of gas after operations for complete laceration, as well as to overcome spasmodic contraction of the muscle during the healing process. He now adopts Simon's suggestion, to divide the sphincter posteriorly, but does this after instead of before the operation. The tip of the left index finger is inserted into the anus, and if the opening is found to be too narrow subcutaneous incision of the muscle is practised with a curved tenotome, the finger acting as a guide to protect the bowel. It is better to make two incisions, one on either side of the median line posteriorly, about half an inch apart. Then a piece of rubber tubing wrapped in iodoform gauze is introduced to the depth of two inches. The pain usually accompanying the subcutaneous incision is slight, and the sphincter regains its function perfectly.

The writer adds that catgut is not the best material for buried suture of the sphincter and levator ani muscles. He prefers fine linen thread, as suggested by Pagenstecher.

Paraffin Injections in Incontinence of Urine.—Gersuny (*Centralblatt für Gynäkologie,* 1900, No. 48) reports a case of incontinence complicating gonorrhœal vaginitis, in which under cocaine anæsthesia he injected paraffin ointment beneath the everted mucous membrane at the neck of the bladder. Similar injections were made about the meatus. A firm ring was formed around the vesical orifice which completely closed it, as was shown by injecting water. Two hours later a catheter was passed, and it was necessary to empty the bladder in this way for twenty-four hours, no dribbling having occurred in the meantime. As the incontinence returned the paraffin injections were repeated a week later, which resulted in severe tenesmus during the next two or three days, but five days after the second operation the patient was able to retain her urine for an hour and a half. When examined three weeks later the ring of paraffin around the neck of the bladder was unchanged.

Three months after the last injection the patient reported that she could retain her urine from four to six hours, and had no dribbling on exertion. The cure was permanent.

OPHTHALMOLOGY.

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Tobacco Amblyopia in Daily Practice, with Analysis of Fifty Consecutive Cases.—KERR (*Quarterly Medical Journal for Yorkshire, etc.*, May, 1901) calls attention to the salient symptoms of tobacco amblyopia as contrasted with other conditions leading to poor vision, based on an analysis of fifty cases. Bright's disease, tabes, cataract, and simple glaucoma are to be excluded. Any of these diseases may complicate the toxic amblyopia.

Tobacco amblyopia occurs generally in men from forty-five to fifty-five. One of his cases was only twenty-six, in a man who had smoked at least half an ounce thick twist daily for two years. Another occurred in a man, aged eighty-six years, who had smoked a similar amount for many years. Patients are generally smokers of three ounces or more weekly of the coarse and dark kinds of tobacco, and some use as much as an ounce daily. Many also chew; but it is not a necessary result of even excessive smoking. The disease may come on insidiously or rapidly, in a week or two, as failure of central vision. It is always painless. The visual acuity is very poor, often less than 6/60, and scarcely improved by glasses. In about one-third of the cases some atrophy is noted, the outer half of the disk generally being very pale, and in a few the arteries markedly narrowed. The lesion is at first limited to the macula or the macular bundle of the optic nerve, so that there is at the macula and around it a region where colors are not well recognized, and at the macula itself an exceedingly small area where even white is not distinguished. To detect the scotoma a bit of red one centimetre square is shown the patient. He will fail to recognize its real color. One eye often shows the color scotoma better than the other, apart from differences in the visual acuity of the two eyes.

Tobacco is the cause of the disease, but many debilitating causes may contribute. Alcoholic excess is frequently associated; its importance is probably exaggerated. The Australian horses which eat wild tobacco and become amblyopic are certainly free from alcoholism. Other associations, generally of a debilitating nature, may be present. In one case a blow on the eye seemed to cause the onset, and that eye was the worst. The author thinks hypermetropia too frequent an association to be accidental. One case, with stomach trouble debilitating her, was remarkable as being in a woman, the small amount of tobacco consumed (half an ounce weekly dark shag) and the speedy onset within a year. Relapses are rare.

The treatment is to stop tobacco in every form. The vision may deteriorate for a week or ten days; it should soon begin to improve, and in two months very definite improvement should have taken place. Strychnine appears to hasten improvement; it is said, also, to relieve the desire for tobacco. Some, but very few, may, if due to debilitating causes, improve without discontinuing the tobacco as the health improves. It is well to look for tobacco amblyopia as a complication in other ocular diseases. Its discovery may improve the prognosis.

New Method of Muscular Advancement in Strabismus.—FROMAGET (*Journ. de Med. de Bordeaux,* 1901, No. 18) calls attention to the unsightliness of the buckling of the tissues which necessarily results from advancement of the tendons of the recti muscles as usually practised, and to the loss of motility due to the adhesion of the conjunctiva as a bridle in the cicatrix. The ideal should here be not only to straighten the eye, but also to preserve its movements intact. The muscular insertions are to be displaced without the involvement of the conjunctiva. To accomplish this he employs the following procedure: 1. After having tenotomized the retracting muscle he divides the conjunctiva, over the tendon to be advanced, in a vertical curved line, concave toward the cornea, about 4 mm. from the limbus. 2. He then dissects the distal conjunctival flap as far back as possible to disengage the tendon and its expansions. He next dissects the corneal flap of the conjunctiva so as to be able to slide the end of the tendon beneath it according to the degree of advancement desired. 3. An assistant then raises and retracts the distal flap of the conjunctiva. Two sutures are passed through the exposed tendon—one above and one below. The needle is passed into the episcleral tissue and made to emerge near the vertical diameter of the cornea, above and below, exterior to the limbus. The suture thus includes the tendon, the episcleral tissue, and the corneal flap of the conjunctiva. 4. The tendon is then divided on a level with the sclera, care being taken not to cut the sutures. 5. The eye is brought into the desired position by means of fixation forceps in the hands of an assistant, and the two sutures are then drawn tight and tied. The sutures thus include in their knot only the corneal conjunctiva, which readily smooths out later. 6. As to the flap of distal conjunctiva, it is left to smooth itself out and to cover over the operative field. If it is too redundant, enough is resected to make nice contact with the corneal flap. A small superficial conjunctival suture can be applied if thought necessary.

As in the ordinary procedure, the muscle is seized further back and the sutures are brought out nearer to the vertical diameter of the cornea, according as a more decided degree of advancement is desired. The results obtained by this method have been durable and satisfactory from a cosmetic point of view.

The Electric Light in Ophthalmology.—AUBARET (*Journ. de Med. de Bordeaux,* 1901, No. 19) extols the electric light for various diagnostic purposes in ophthalmology (beside its use as a source of illumination in ophthalmoscopy) as in lateral and indirect illumination, exploration of the ocular globe by transparency, and of the sinuses by diaphanoscopy. The test-letters and optometers can be illuminated by electricity, and the mobility of the muscles can be examined more accurately by the same light. For the illumination of the fundus electric lamps of ground-glass are preferable, giving a more uniform and less intense light. They may be placed behind screens; it is better, however, to surround them with a metallic cylinder having a circular opening 45 mm. in diameter. Such an opening gives light enough. This arrangement emits almost no heat. It constitutes a real advance in the classical technique of ophthalmoscopic examination.

1. The electric light can be attached to the handle of the ophthalmoscope itself, inclining the mirror at 45°. Wolf's method of using the total reflection of a prism is, however, much to be preferred. His very ingenious instrument was shown at the Congress of Ophthalmology. Aubaret makes use of a different plan. He dispenses with the mirror, the light taking its place directly—a small electric lamp enclosed in a metallic envelope having an opening in its anterior part. It may be placed quite close to the sight hole, in front of a plate like that which carries the mirror in an ordinary ophthalmoscope. It can be adapted to any ophthalmoscope. It is not necessary to throw upon the pupil a homocentric pencil, as with the mirror. Both pupils are illuminated at once. Examination with the indirect image is very satisfactory. The fields of illumination and examination are as extensive as by the ordinary method. As a matter of fact, the entire pupil is not utilized, but the pupillary field is the more illuminated the closer the lamp is brought to coincide with the line of sight. Thus examination in the direct image is less satisfactory than in the indirect. The method realizes in a perfect way the primitive disposition of Brücke's experiment. Stilling, who was one of the few to practice orthoscopy, made use of an analogous but less perfect plan. But with the former methods of illumination orthoscopy was useful only in exceptional conditions, such as high degrees of hypermetropia, or detachment of the retina. Thanks to the electric light, it may now rival ophthalmoscopy.

2. Oblique illumination. Lateral illumination is greatly facilitated by the use of the electric light. Aubaret employs two metallic tubes sliding the one into the other, one of which carries the electric lamp and the other a strong converging lens. Any desired degree of convergence of the light can thus be obtained.

3. Illumination by transparency and illumination of the sinuses. Diaphanoscopy of the eyeball requires special forms of illumination. Cylinders of glass permitting the concentration of the rays upon a very small surface are employed as in the apparatus of Birnbacher and Rochon-Duvignaud. Optometric measurements may also be made under very convenient conditions of illumination. Transparent test-letters illuminated by lamps placed behind them permit of measurements comparable with one another. The optometric scales can be illuminated in the same way.

Optometric measurements can also be made in the dark-room, a great advantage, because more perfect relaxation of the accommodation is thus obtained. Finally, a very elongated electric lamp, having somewhat the form of a luminous cylinder, 12 cm. long and 2 cm. in diameter, mounted on a handle, can be readily carried into all parts of the field for examining the condition of the muscles by means of double images. The position of the false images, and especially their inclinations, can be best determined by this apparatus—a determination very difficult with the ordinary candle. Its light, also, is fixed and immovable and not waving like the ordinary flame, permitting much greater precision and exactness.

Injections of Vaseline after Enucleation of the Eyeball.—DIANOUX (*Gaz. Méd. de Nantes*, 1901, No. 31) recommends the injection of vaseline after enucleation for the purpose of giving the stump a convex shape forward in place of the concavity ordinarily obtained. The injection is practised into the soft tissues in the axis of the orbit to a depth of 5 or 6 mm., after all inflammatory reaction has disappeared. He concludes: 1. That the injection of vaseline is entirely harmless. 2. That any degree of projection desired can be given to the tissues. 3. That the stump thus obtained possesses great mobility. 4. That a radical reform is to be expected in the shape of artificial eyes.

HYGIENE AND PUBLIC HEALTH.

UNDER THE CHARGE OF

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The Possibility of Infection by Minute Droplets Thrown Out in Speaking, Coughing, and Sneezing.—Bearing on the contention of Flügge, denied by Cornet, that the transmission of pulmonary tuberculosis from one person to another is chiefly by means of the finest droplets thrown into the air in speaking, coughing, and sneezing, the experiments of DR. H. KOENIGER (*Zeitschrift für Hygiene und Infectionskrankheiten*, xxxiv., p. 119) are of interest. In order to give the expelled droplets a character which would enable them to be traced, he rinsed his mouth with liquid rich in *B. prodigiosus* or *B. mycoides* or with very dilute caustic soda. When the bacteria were employed, Petri dishes were exposed at different heights and distances, but when the alkali was used in place of the Petri dishes, glass plates coated with phenolphthalein were exposed. Since this agent turns pink when an alkali is brought in contact therewith, this method enables one to determine not only the number of the droplets, but their size as well. Shortly after rinsing the mouth and rejecting the surplus, he would take a position in a room, avoiding as much as possible unnecessary stirring up of the air, and then speak, sneeze, and cough. After an interval the number of colonies was determined. Tests were made with single letters, with different kinds of speaking by the same person and by different persons—loud, soft, and whispering—and to determine the influence of rapidity. It was found that no droplets are thrown out in ordinary exhalation, nor in vowel formation, while the number is very great with consonants, as *t*, *k*, and *p*, which originate by the sudden release of air under pressure in the mouth cavity, the number depending upon the amount of force with which it is released, and hence largely proportionate to the manner of pronouncing and to the sharpness of consonant formation. Loudness and rapidity have but little influence; indeed, whispering may, under some conditions, cause a greater number of droplets than loud speech. Even with subdued speech and a quiet atmosphere, it was found that the organisms expelled penetrated into the farthest parts of the room, which was over twenty feet in width, and not alone forward, but sideways and backward from the speaker. The bacteria were found not to remain in supension in the air longer than an hour, and it was noticed that they fell upon the plates in groups, sometimes as many as forty close together. This suggests that the bacteria in the droplets do not fall as dry dust particles, but that the droplets themselves, with their contained or adherent organisms, are deposited. The *B mycoides*, which is larger than *B. prodigiosus*, was conveyed through much shorter distances and remained in suspension a much shorter time. In coughing and sneezing, more droplets are expelled than in speaking, and they are thrown to a greater distance, because of the greater amount of force employed.

The danger of infection through droplets can be prevented in great part by holding the hand or a handkerchief before the mouth while sneezing or coughing. Speaking should be restricted as much as possible, and in especially serious conditions the use of gauze veils before the mouth may be advised. Thus the air itself and all objects in the vicinity of the patient will be protected from infection. The precautions mentioned apply not alone to tuberculosis, but to diphtheria, whooping-cough, and other diseases, the organisms of which are found in the air-passages.

The Toxin of the Colon Bacillus.—Since the discovery by PROFESSOR V. C. VAUGHAN and MCCLYMONDS that practically all samples of American cheese contain the colon bacillus and that cultures of this organism may be boiled without destroying its toxicity, work on its toxin has been carried further by the former (*American Medicine*, May 18, 1901, p. 302), assisted by Cooley and Gelston. The bacilli with which they worked were obtained from cheese, water, and normal feces, and their virulence was intensified by passage through a number of animals. After inoculation of Roux flasks of 2 per cent. agar with a beef-tea culture of the bacillus and subsequent incubation, the growths were scraped from the surface of the agar and used in the preparation of the toxin. The facts learned from numerous experiments with the germ substance thus obtained are summed up as follows: The toxin is contained within the germ-cell, from which it does not, at least under ordinary conditions, diffuse into the culture medium. It is not extracted from the cell by alcohol, ether, or very dilute alkalies, nor is it destroyed when the germ-substance is heated to a high temperature with water. Neither the germ-cell nor its toxin is much, if at all, affected by boiling with a 2 per cent. solution of hydrochloric acid, but the former is broken up and the latter affected, but not destroyed, by being heated for an hour on the water-bath with water containing from 1 to 5 per cent. of the acid, and the toxin is made inert by prolonged heating. The toxin, separated from the cell wall by digestion of the latter with 2 per cent. hydrochloric acid and 0.5 per cent. pepsin, is markedly active and stable, and can be permanently preserved in the dry state.

How the toxin, if confined in the cell wall, is set free when the living or dead germ is introduced into an animal; whether, if this is accomplished by phagocytic action, the phagocytes destroy the toxin when they kill the germ; whether the cell contains both a toxin and an immunizing body, or the toxin can be converted by artificial means or within the system into an immunizing body, are questions under investigation.

Hydrocyanic Acid Gas as a Disinfectant.—In a preliminary note on the disinfectant properties of hydrocyanic gas, DR. J. S. FULTON (*American Medicine*, May 11, 1901, p. 256) gives the results of a number of experiments and suggests this agent as a reliable germicide for the disinfection of houses and ships. With regard to the feeling of danger which its employment in public health work might excite, attention is called to the extensive use of potassium cyanide in the industrial arts and of the gas in the disinfection of nursery stock and green-houses, with practically no record of accidents. Against organisms no hardier than those of diphtheria and typhoid fever it appears to be about as effective as formaldehyde, though more gas is needed and perhaps a longer exposure. Like other gaseous agents, it possesses no marked power of penetration. In the experiments iron wire, wet, was attacked by the gas and received a thin coat of Prussian blue; paper labels were stained brown; and cotton, exposed several times, became brown and brittle. The gas is best generated by the action of dilute sulphuric acid (acid 1.5 part, water 2.25 parts) on potassium cyanide (1 part), the contact taking place in earthen jars. About 1 kilogramme of cyanide is required for each 1000 cubic feet of air space. The poisonous properties of the gas make it necessary to exercise caution in its use and to ventilate well on the expiration of the period of exposure.

[In view of the greater cost of material for the disinfection of a given place, the possible danger attending its use, and the admitted inferiority to formaldehyde as a general germicide, it would appear that the only advantage attending its use is its superior toxicity to animal life, on which account, as the author points out, it has been extensively used in flouring-mills (weevils), railway cars (bed-bugs), tobacco warehouses (insects in general), and might be very useful for killing rats and other vermin in ships' holds.—C. H.]

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OFFICIAL REPORT OF THE CASE OF PRESIDENT WILLIAM McKINLEY

BY THE MEDICAL ATTENDANTS.

THE following report has received the approval of and is issued by the undersigned, the medical staff attending the late President William McKinley.

P. M. RIXEY,
MATTHEW D. MANN,
HERMAN MYNTER,
ROSWELL PARK,
EUGENE WASDIN,
CHARLES McBURNEY,
CHARLES G. STOCKTON.

SURGICAL HISTORY.

PRESIDENT WILLIAM McKINLEY was shot by Leon F. Czolgosz in the Temple of Music, at the Pan-American Exposition, Buffalo, N. Y., at about seven minutes past 4 on the afternoon of Friday, September 6, 1901. Two shots were fired. One bullet struck near the upper part of the sternum, and the other in the left hypochondriac region. The President was immediately conveyed to the Emergency Hospital on the Exposition grounds by the motor ambulance, where he arrived at 4.18. Dr. G. McK. Hall and Mr. Edward C. Mann, medical student of the house staff, were in charge of the ambulance, Medical Student T. F. Ellis being the driver.

On arriving at the hospital President McKinley was at once placed upon the table in the operating-room and undressed. During the removal of his clothing a bullet fell out and was picked up by Mr. Ellis. Dr. Hall placed a temporary antiseptic dressing over the wounds, and Mr. Mann ordered a nurse to administer 0.01 gramme of morphine and 0.002 gramme of strychnine hypodermically.

Dr. Herman Mynter, who had been telephoned from police headquarters to report immediately at the Exposition Hospital, was the first surgeon to arrive, at 4.45 o'clock. At that time Drs. P. W. Van Peyma and Joseph Fowler, of Buffalo, N. Y., and Dr. Edward Wallace Lee, of St. Louis, were present. Dr. Mynter brought with him Dr. Eugene Wasdin, of the United States Marine Hospital Service.

Dr. Mynter inspected the President's wounds and immediately saw their serious nature. He told the President that it would be necessary to operate, and at once set about making preparations, aided by the house staff and nurses and Dr. Nelson W. Wilson, Sanitary Officer of the Exposition, who at that time assumed charge of the hospital in the absence of Dr. Roswell Park, the Medical Director of the Exposition. The President's pulse on the arrival of Dr. Mynter was 84; he had no particular pain in the abdomen, and no apparent loss of liver dulness. He was evidently slightly under the influence of the morphine.

Dr. Matthew D. Mann arrived at the hospital at 5.10 P.M., having been telephoned for by Mr. John C. Milburn. He was followed five minutes later by Dr. John Parmenter.

An examination was at once made, followed by a short consultation between Drs. Mann, Mynter, and Wasdin, which resulted in the decision to operate at once. The necessity for the operation was explained to President McKinley, and he gave his full consent. Immediate operation was decided upon because of the danger of possible continued internal hemorrhage and of the escape of gastric or intestinal contents into the peritoneal cavity, and because the President's pulse was getting weaker. Moreover, the daylight was rapidly failing. Dr. Roswell Park, who, by virtue of his office, had he been present would have performed the operation, was at Niagara Falls, and although a special train had been sent for him, it was uncertain when he would arrive.

Dr. Mann was selected to do the operation, with Dr. Mynter as his associate, by the common consent of the physicians present, and at the request of Mr. Milburn, President of the Pan-American Exposition, who stated that he had been requested by President McKinley to select his medical attendants. Dr. Mann selected Drs. Lee and Parmenter as assistants.

At 5.20 Dr. Mann directed the administration of ether to President McKinley, and requested Dr. Wasdin to administer it. Ether was chosen as being, on the whole, the safer anæsthetic. While the anæsthetic was being given the surgeons who were to take part in the operation prepared their hands and arms by thoroughly scrubbing with soap and water and immersing them in a solution of bichloride of mercury.

The operation began at 5.29. Dr. Mann stood upon the right-hand side of the patient, with Dr. Parmenter on his right-hand side. Dr. Mynter stood upon the left-hand side of the patient, and on his right was Dr. Lee. To Drs. Parmenter and Lee were assigned the duties of sponging and the care of the instruments. Dr. P. M. Rixey, U. S. N., President McKinley's family physician, having been detailed by the President to accompany Mrs. McKinley to the Milburn home, did not arrive until 5.30, when he gave very efficient service by guiding the rays of the sun to the seat of the operation by aid of a hand-mirror, and later by arranging an electric light. Dr. Roswell Park arrived just as the operation on the stomach was completed, and gave his aid as consultant. Mr. E. C. Mann had charge of the needles, sutures, and ligatures. Mr. Simpson, medical student, was at the instrument tray.

The nurses, under the charge of Miss A. C. Walters, superintendent of the hospital, were Miss M. E. Morris and Miss A. D. Barnes, with hands sterilized; Miss Rose Baron, Miss M. A. Shannon, and Miss L. C. Dorchester, assistants, and Miss Katharine R. Simmons attending the anæsthetizer.

Beside those immediately engaged in the operation there were present Drs. P. W. Van Peyma, Joseph Fowler, D. W. Harrington, and Charles G. Stockton, of Buffalo, and Dr. W. D. Storer, of Chicago.

The Operation.

President McKinley took the ether well, and was entirely under its influence in nine minutes after the beginning of the anæsthetization. The abdomen was carefully shaved and scrubbed with green soap, and then washed with alcohol and ether and the bichloride solution.

Inspection showed two wounds made by the bullets. The upper one was between the second and third ribs, a little to the right of the sternum. The use of a probe showed that the skin had not been penetrated, but that the bullet had probably struck a button or some object in the clothing which had deflected it. The lower wound made by the other bullet—a thirty-two calibre—was on a line drawn from the nipple to the umbilicus. It was about half-way between these points and about 5 cm. to the left of the median line. A probe showed that this wound extended deeply into the abdominal walls, and that the direction was somewhat downward and outward.

An incision was made from the edge of the ribs downward, passing through the bullet wound and nearly parallel with the long axis of the body. A deep layer of fat was opened, and followed by incision of the fascia and muscles to the peritoneum. After cutting through the skin, a piece of cloth, undoubtedly a bit of the President's clothing, was removed from the track of the bullet, a short distance below the skin.

On opening the peritoneum the finger was introduced and the anterior wall of the stomach palpated. An opening was discovered which would not quite admit the index finger. This opening was located near the greater curvature of the stomach and about 2 cm. from the attachment of the omentum; its edges were clean-cut and did not appear to be much injured.

The stomach was drawn up into the operation wound, and the perforation very slightly enlarged. The finger was then introduced and the contents of the stomach palpated. This was done to see if the stomach contained food, and also with the hope that possibly the bullet might be in the stomach. The stomach was found to be half-full of liquid food, but no evidence of the ball was discovered. In pulling up the stomach a small amount of liquid contents escaped, together with a good deal of gas. The tissues around the wound were carefully irrigated with hot salt solution and dried with gauze pads. The perforation in the anterior stomach wall was then closed with a double row of silk sutures (Czerny-Lembert). The sutures were not interrupted with each stitch, but four stitches were introduced before the ends were tied. The loop was then cut off and the sutures continued. About eight stitches were used in each row. The silk used was fine black silk, the needle being a straight, round sewing needle.

In order to examine the posterior wall of the stomach it was necessary to enlarge the incision, which now reached about 15 cm. in length. The omentum and transverse colon were pulled well out of the abdomen. The omentum was enormously thickened with fat and very rigid. In order to reach the back wall of the stomach it was necessary to divide about four inches of the gastrocolic omentum, the cut ends being tied with strong black silk in two masses on each side. In this way the stomach could be drawn up in the operation wound and the bullet wound in its posterior wall reached. This opening was somewhat larger than that in the anterior wall of the stomach, and had frayed and blood-infiltrated edges. Its exact location was impossible to determine, but it appeared to be near the larger curvature.

This opening was closed in the same way as the anterior wound, but with great difficulty, as the opening was down at the bottom of a deep pocket. A short curved surgical needle was necessary here. Little or no gastric contents appeared around this opening, but after it had been closed the parts were carefully irrigated with hot salt solution.

The operation on the stomach being now finished, Dr. Mann introduced his arm so as to palpate carefully all the deep structures behind the stomach. No trace of the bullet or of the further track of the bullet could be found. As the introduction of the hand in this way seemed to have a bad influence on the President's pulse, prolonged search for further injury done by the bullet, or for the bullet itself, was desisted from. The folds of the intestine which had been below the stomach were inspected for injury, but none was found. The entire gut was not removed from the abdomen for inspection, as the location of the wound seemed to exclude its injury. To have made a satisfactory search for wounds in the President's back it would have been necessary to have entirely eviscerated him. As he was already suffering from shock, this was not considered justifiable, and might have caused his death on the operating-table.

Before closing the abdominal wound Dr. Mann asked each of the surgeons present whether he was entirely satisfied that everything had been done which should be done, and whether he had any further suggestions to make. Each replied that he was satisfied. The question of drainage was also discussed. Dr. Mynter was in favor of a Mikulicz drain being placed down behind the stomach wall. Dr. Mann, with the concurrence of the other surgeons, decided against this, as being unnecessary.

As the last step in the operation the tissues around the bullet track in the abdominal wall were trimmed in order to remove any tissue which might be infected. The abdominal wound was then closed with seven through-and-through silkworm-gut sutures, drawn only moderately tight, the superior layer of the fascia of the rectus muscle being joined with buried catgut. The edges of the skin were brought together by fine catgut sutures. Where the bullet had entered there was slight gaping of the tissues, but it was not thought advisable to close this tightly, as it might allow of some drainage. The wound was then washed with hydrogen dioxide and covered with aristol powder and dressed with sterilized gauze and cotton, which were held in place with adhesive straps. Over all was put an abdominal bandage.

The President bore the operation very well. The time from the beginning of the administration of the anæsthetic until its discontinuance was exactly an hour and thirty-one minutes; the operation was completed at 6.50 P.M., having lasted from the time of the first incision an hour and twenty-one minutes. At the beginning of the operation President McKinley's pulse was 84. At 5.38, 0.002 gramme of strychnine was administered hypodermically. At 5.55 the respiration was 32 and the pulse 84—both good in character. At 6.09 the pulse was 88. At 6.20 it was 102, fair in character; respiration 39. At 6.22, 1.50 gramme of brandy was administered hypodermically. At 6.48 the pulse was 124, the tension good but quick; respiration 36. At 7.01, after the bandage was applied, the pulse was 122 and the respiration 32. At 7.17, 0.004 gramme of morphine was administered hypodermically.

At 7.32 the patient was removed from the hospital in the ambulance. Dr. Rixey asked Drs. Park and Wasdin to go in the ambulance, as his duty called him to go at once to inform Mrs. McKinley of her husband's condition and to prepare a room for his reception. Drs. Mann and Mynter, with friends of the President, followed in carriages immediately after. President McKinley had not then recovered from the anæsthetic. He bore the journey to Mr. Milburn's house exceedingly well, but it was found necessary to give him a small hypodermic injection of morphine during the transit, as he was becoming very restless. On arrival at the house of Mr. Milburn, 1168 Delaware Avenue, he was removed from the ambulance on the stretcher, and carried to a room in the northwest corner of the house, where a hospital bed had been prepared for him.

REMARKS ON THE OPERATION. BY MATTHEW D. MANN, M.D.

The difficulties of the operation were very great, owing partly to the want of retractors and to the failing light. The setting sun shone directly into the room, but not into the wound. The windows were low and covered with awnings. After Dr. Rixey aided us with a hand-mirror the light was better. Toward the end of the time a movable electric light with reflector was put in use. The greatest difficulty was the great size of President McKinley's abdomen and the amount of fat present. This necessitated working at the bottom of a deep hole, especially when suturing the posterior wall of the stomach.

The operation was rendered possible and greatly facilitated by a good operating-table and the other appliances of a hospital and by the presence of many trained nurses and assistants. Still, the hospital was only equipped for minor emergency work, and had but a moderate supply of instruments. Unfortunately, when called I was not told what I was wanted for, and went to the Exposition grounds entirely unprepared. Dr. Mynter had his large pocket case, the contents of which were of great use.

As has already been noted, further search for the bullet was rendered inadvisable by the President's condition. The autopsy shows that it could not have been found, and that the injuries inflicted by the bullet after it passed through the stomach were of such a nature as to render impossible and unnecessary any further surgical procedure. A bullet after it ceases to move does little harm. We were often asked why after the operation we did not use the X-ray to find the bullet. There were several reasons for this. In the first place, there were at no time any signs that the bullet was doing harm. To have used the X-ray simply to have satisfied our curiosity would not have been warrantable, as it would have greatly disturbed and annoyed the patient, and would have subjected him also to a certain risk. Had there been signs of abscess formation, then the rays could and would have been used.

My reason for not draining was that there was nothing to drain. There had been no bleeding nor oozing; there was nothing to make any discharge or secretion; the parts were presumably free from infection, and were carefully washed with salt solution. As there was no peritonitis and the abdomen was found post-mortem to be sterile, we may safely conclude that no drainage could have been provided which would have accomplished anything. My experience teaches me never to drain unless there is a very decided indication for it, as a drain may do harm as well as good.

In conclusion, I wish to thank all the gentlemen who so kindly and skilfully assisted me. They were all surgeons of large experience in abdominal surgery, and their aid and advice were most valuable. Especially I wish to acknowledge my great obligation to my associate, Dr. Mynter. Not only was he an assistant, but he was much more, and helped me greatly by his skill, and, as a consultant, with his good judgment and extensive knowledge of abdominal work. Although called first, he waived his claim and generously placed the case in my hands, willingly assuming his share of the responsibility.

The anæsthetic was most carefully administered by Dr. Wasdin, and the knowledge that he had charge of this very important duty relieved me of any anxiety on that score.

In the eventful week that followed the operation, Dr. Park and Dr. McBurney were towers of strength in helping to decide the many difficult questions which came up.

Dr. Rixey was in constant charge of the sick-room, aided later by Dr. Wasdin, who was detailed for this special duty. Both were unremitting in their care, and faithful to the end.

Dr. Stockton helped us in the last three days with the highest skill and best judgment.

Never, I am sure, under like circumstances, was there a more harmonious or better-agreed band of consultants. That our best endeavors failed was, I believe, no fault of ours; but it must be an ever-living and keen regret to each one of us that we were not allowed the privilege of saving so noble a man, so attractive a patient, and so useful a life.

THE AFTER TREATMENT.

When put to bed the President was in a fair condition: Pulse, 127; temperature, 100.6°; respiration, 30. The nurses on duty were Miss K. R. Simmons and Miss A. D. Barnes, from the Emergency Hospital. Soon after his arrival, at 8.25, he was given morphine, 0.016 gramme, hypodermically. There was slight nausea. The pulse soon improved. During the evening the patient slept at intervals, vomiting occasionally, but rallied satisfactorily. A slight discoloration of the dressings was noted at 10.45. There was occasional and slight pain. Ninety c.c. of urine was voided, and an enema of salt solution given and retained.

Second day, Saturday, September 7. After midnight the patient slept a good deal; he was free from pain and quite comfortable.

At 6 A.M the temperature was 102°; pulse, 110; respiration, 24.

Gas in large quantities was expelled from the bowels. A saline enema was given as before. Miss Simmons and Miss Barnes were replaced by Miss Maud Mohan and Miss Jane Connolly. Miss E. Hunt, of San Francisco, Cal., Mrs. McKinley's nurse, also rendered assistance, and Miss Grace Mackenzie, of Baltimore, Md., arrived September 9th, and was detailed for regular duty. P. A. Eliot, J. Hodgins, and Ernest Vollmeyer, of the United States Army Hospital Corps, were detailed as orderlies.

During the forenoon 0.01 gramme of morphine was administered hypodermically.

At 1.15 P.M. a saline enema of 500 c.c. was given. As the pulse was rising, 0.06 gramme of fluid extract of digitalis was injected hypodermically.

The President rested quietly until 6.30 P.M., when he complained of intense pain in the pit of the stomach, and was given 0.008 gramme of morphine sulphate hypodermically. He was very restless, but after being sponged rested again.

At 6.30 P.M. the pulse was 130; temperature, 102.5°; respiration, 29.

During the day the digitalis and morphine, and the saline enemas were kept up at regular intervals; 4 grammes of somatose were added to the water at 10.30 P.M. At 11.15 P.M. the President passed from the bowels 240 c.c. of a greenish-colored fluid and some particles of fecal matter.

The total amount of urine for twenty-four hours was 270 c.c.

First Urinalysis, by Dr. H. G. Matzinger.

Quantity	30. c.c.
Color	dark amber.
Reaction	strongly acid.
Urea	0.026 gm. per 1 c c. of urine.
Albumin	a trace.
Phosphates and chlorides	normal.
Sugar	none.
Indican	very small amount.

Microscopical Examination. The sediment obtained by centrifuge shows a large amount of large and small epithelial cells, with some leucocytes and occasional red cells. There is a comparatively large number of hyaline casts, principally small, with some finely granular ones; also an occasional fibrinous one. The amount of sediment is large for the quantity of urine submitted. There were no crystals in the sediment.

Third day, Sunday, September 8th. During the early morning the President slept a good deal, but was restless, and at times confused and a little chilly. On the whole, he passed a fairly good night.

He expelled a little gas and brown fluid from the rectum. The digitalis was continued, and at 7.45 A.M. 0.002 gramme of strychnine was given hypodermically. At 8.20 A.M. he was clear and bright, with the pulse strong and of good character.

The wound was dressed at 8.30, and found in a very satisfactory condition. There was no indication of peritonitis. Pulse, 132; temperature, 102.8°; respiration, 24.

The dressing on the wound was changed because there was some exudation. The bullet tract was syringed out with hydrogen dioxide. There was very little foaming, and there were no signs of pus.

At 10.40 A.M., following an enema of Epsom salts, glycerin, and water, he had a small stool with gas, and another at noon. He was less restless and slept a good deal.

At noon Dr. Charles McBurney, having been summoned by Dr. Rixey, joined the medical staff in consultation.

Bulletin 14, 12 M. The improvement in the President's condition has continued since the last bulletin. Pulse, 128; temperature, 101°; respiration, 27.

During the day he continued to improve; he slept four or five hours, and his condition was satisfactory.

At 4.45 P.M. he was given a teaspoonful of water by the mouth; also an enema of sweet oil, soap, and water. He passed slightly colored fluid with some little fecal matter and mucus. After this he had a small quantity of water by the mouth, and at 6.20 P.M. a nutritive enema of egg, whiskey, and water, which was partly retained. Digitalis and strychnine were both given during the evening.

At 9.P.M. the President was resting comfortably. The pulse was 130; temperature, 101.6°; respiration, 30.

Four hundred and twenty c.c. of urine was passed during the day.

Second Urinalysis.

Quantity	450 c.c.
Color	amber, slightly turbid.
Reaction	strongly acid.
Specific gravity	1.026.
Urea	0.038 gm. per 1 c.c. of urine.
Albumin	mere trace.
Sugar	none.
Indican	abundant.
Sulphates	increased.
Phosphates and chlorides	somewhat increased.

Microscopical Examination. Microscopical examination of sediment obtained by centrifuge shows fewer organic elements. Some large and small epithelial cells and some leucocytes. Casts are not so abundant as yesterday, and are principally of the small finely granular variety. There is a marked diminution in the small renal epithelial cells.

Quite a quantity of large crystals of uric acid and bacteria are present.

Fourth day, Monday, September 9. The bulletins tell the story of the fourth day.

Bulletin 17, 6 A.M.. The President passed a somewhat restless night, sleeping fairly well. General conditions remained unchanged, Pulse, 120; temperature, 101°; respiration, 28.

Bulletin 18, 9.20 A.M. The President's condition is becoming more and more satisfactory. Untoward incidents are less likely to occur. Pulse, 122; temperature, 100.8°; respiration, 28.

Bulletin 19, 3 P.M. The President's condition steadily improves, and he is comfortable, without pain or unfavorable symptoms. Bowel and kidney functions normally performed. Pulse, 113; temperature, 101°; respiration, 26.

Bulletin 20, 9.30 P.M. The President's condition continues favorable. Pulse, 112; temperature, 101°; respiration, 27.

Codeia was substituted for morphine, as the pain was less. Digitalis and strychnine were stopped. Nutritive enemas were given at 3.20 A.M., 4.30 and 10 P.M. Hot water was taken quite freely by the mouth.

Attempts to get a good movement of the bowels were successful at noon, when he had a large light-brown, partly-formed stool. This followed a small dose of calomel and a high enema of oxgall.

On the whole the President's condition improved steadily during the day. He slept a good deal and was fairly comfortable. There was no pain on pressure over the abdomen.

Third Urinalysis.

Quantity received	540 c. c.
Color	amber, slightly turbid.
Specific gravity	1.026.
Albumin	a trace.
Indican	not so abundant as yesterday.
Urea	0.047 gm. per 1 c. c. of urine.
Chlorides and phosphates	about normal.
Sulphates	still somewhat high.
Sugar	none.

Microscopical Examination. Microscopical examination of sediment obtained by centrifuge shows a decrease in the amount of organic elements and an increase of amorphous urates, but fewer crystals of uric acid. Casts are fewer and only the small granular and large hyaline varieties. The proportion of casts is greater. There are very few epithelial cells, mostly of renal type. A large number of cylindroids are found.

Fifth day, Tuesday, September 10. Soon after midnight the President had a high enema of soap and water, which was expelled, together with some fecal matter. He took hot water frequently and slept a good deal.

Bulletin 21, 5.20 A.M. The President has passed the most comfortable night since the attempt on his life. Pulse, 118; temperature, 100.4°; respiration, 28.

On awaking he felt very comfortable, and his mind was clear and cheerful. The nutritive enemas were kept up and water given by the mouth. Had two small stools during the day. The only medicine given was one hypodermic of codeia phosphate, 0.015 gramme.

In the evening the dressings were examined, and as there was considerable staining from the discharge it was thought best to remove four stitches and separate the edges of the wound. A little slough was observed near the bullet track, covering a space nearly an inch wide, the thickness of the flaps. The separation seemed to extend down to the muscle. The surfaces, except those mentioned, looked healthy, but not granulating. It was supposed that the infection of the wound occurred either from the bullet or from the piece of clothing carried into the wound at the time of the shooting. The parts were thoroughly washed with hydrogen dioxide and packed lightly with gauze, and held together with adhesive straps.

Sixth day, Wednesday, September 11.—*Bulletin* 26, 9 A.M. The President rested comfortably during the night. Decided benefit has followed the dressing of the wound made last night. His stomach tolerates the beef juice well, and it is taken with great satisfaction. His condition this morning is excellent. Pulse, 116; temperature, 100.2°.

Bulletin 27, 3.30 P.M. The President continues to gain, and the wound is becoming more healthy. The nourishment taken into the stomach is being gradually increased. Pulse, 120; temperature, 100.2°.

Bulletin 28, 10 P.M. The President's condition continues favorable. Blood count corroborates clinical evidence of the absence of any blood poisoning. He is able to take more nourishment and relish it. Pulse, 120; temperature, 100.4°.

The blood count made by Dr. Wasdin in the evening was as follows:

Leucocytes	6,752
Red cells	3,920,000

A little after midnight Wednesday morning the patient was given 4 c. c. of beef juice, the first food taken by the stomach. It seemed to be very acceptable. Nutritive enema was given at 2 A.M.; later there was a yellow stool.

From 4 to 8 c. c. of beef juice was given every one to two hours during the day. The rectum was becoming irritable, and did not retain the nutritive enemas well.

At 10 A.M. the remaining stitches were removed, the wound separated and dressed. It seemed to be doing well. Most of the sloughing tissue had separated.

The patient slept much during the day, and expressed himself as feeling very comfortable. The only medicine administered was one hypodermic of strychnine.

In the evening he was changed to a fresh bed. Nutritive enemas were continued.

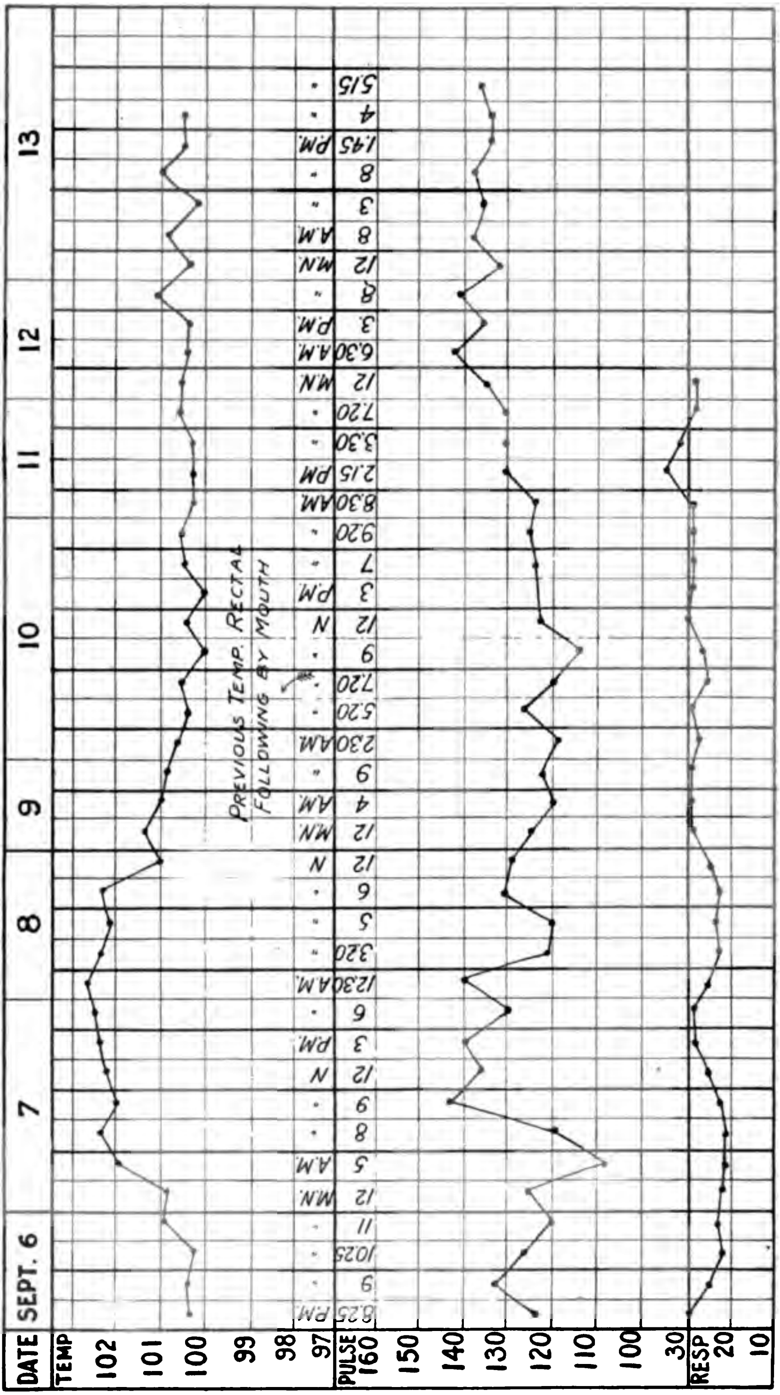
Urine was passed much more freely—750 c. c. in twenty-four hours.

Fourth Urinalysis.

Quantity	82 c.c.
Color	amber, clear.
Specific gravity	1.027.
Reaction	strongly acid.
Albumin	a trace.
Indican	abundant.
Urea	0.04 gm. per 1 c.c. of urine.
E. phosphates and chlorides	normal.
Sulphates	still a little high.

Microscopical Examination. Microscopical examination of sediment obtained by centrifuge shows a marked diminution in amount of organic elements, but a great increase in uric acid crystals.

There are a few epithelial cells—mostly of renal type.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1.45 P.M.
4
5.15
PREVIOUS TEMP. RECTAL
FOLLOWING BY MOUTH

There are fewer casts—small and large hyaline—some finely granular. Cylindroids are more abundant.

Seventh day, Thursday, September 12th. The President slept a good deal during the night, and awoke in the morning feeling better. The beef juice was continued and increased, and a little chicken-broth added to the dietary. He also had a little whiskey and water.

At 8.30 A M. he had chicken-broth, a very small piece of toast and a small cup of coffee. He did not care for the toast, and ate scarcely any of it.

The wound was dressed and washed with a weak solution of iodine and then with hydrogen dioxide. He was given 30 c.c of castor oil at 9.20 A.M.

The President now seemed at his best and his condition to warrant the favorable prognosis given out. The time for peritonitis and sepsis had passed. The bowels had moved and gas passed freely, showing that there was no obstruction. The tongue was clear, and the appetite increasing; and he seemed to be able to digest food. There was no pain or tenderness in the abdomen, and he was able to turn easily and to sleep on his side. The urine was steadily increasing. His spirits were good and his mind clear, while his pulse, though frequent, was strong and of good quality, and the temperature low.

The analysis of the urine gave no uneasiness, as the amount of urea was fair; there was no albumin worth considering, and the casts were rapidly diminishing. There were no more of them than are found in a large percentage of cases following a long operation under ether. The excess of indican was taken to mean merely some intestinal indigestion, and to be of no serious import. The only symptom to cause any uneasiness was the frequency of the pulse. Still, anxiety on this score was relieved by knowing that the President had naturally a rapid pulse, and that it was easily excited. The open wound was not considered important. It looked healthy, and, though it would take a long time to heal, in itself it was evidently causing no harm, nor was it likely to.

Dr. McBurney left Buffalo for his home in the morning, having arranged to return at once if his presence was desired.

Toward noon it was noticed that the character of the pulse was not quite so good. Infusion of digitalis, 8 c.c., was ordered, and strychnine, 0.002 gramme.

It was thought probable that there was some intestinal toxæmia, as there had been no free movement from the bowel since food had been begun, the oil having failed to act. Gradually the pulse went to 130, and grew weaker.

Dr. Charles G. Stockton was added to the medical staff in consultation. At 7 P.M. the President was given 0.20 gramme of calomel.

Bulletin 32, 8.30 P.M. The President's condition this evening is not quite so good. His food has not agreed with him, and has been stopped. Excretion has not yet been properly established. The kidneys are acting well. His pulse is not satisfactory, but has improved in the last two hours. The wound is doing well. He is resting quietly. Temperature, 100.2°; pulse, 128.

At 9.30 P.M. a second dose of 30 c.c. of castor oil was given, followed by a high enema of oxgall. This resulted in a large, dark semi-fluid stool, which seemed to exhaust him somewhat. Stimulants were given freely. No more beef juice or food was given. The pulse grew rapidly worse, but at midnight there seemed some improvement, as Bulletin 33 shows. At 11 P.M. 420 c.c. of normal salt solution were given subcutaneously.

Bulletin 33, 12 M. All unfavorable symptoms in the President's condition have improved since the last bulletin. Pulse, 120; temperature, 100.2°.

Fifth Urinalysis.

Quantity	132 c.c.
Color	light amber, very turbid.
Specific gravity	1.025.
Reaction	acid.
Albumin	mere trace, if any.
Indican	less.
Urea	0.044 gm. per 1 c.c. of urine.
Sulphates	about normal.
E. phosphates	much increased.
Chlorides	normal.

Microscopical Examination. Microscopical examination of sediment obtained by centrifuge shows fewer organic elements than the last examination. There is less uric acid and a large amount of amorphous phosphates. Renal casts, about as in the last examination, with very few cylindroids.

Eighth day, Friday, September 13. At midnight the pulse was fairly good, 132. Strychnine and whiskey were given at intervals, and hypodermics of camphorated oil.

Bulletin 34, 2.50 A.M. The President's condition is very serious, and gives rise to the gravest apprehension. His bowels have moved well, but his heart does not respond properly to stimulation. He is conscious. The skin is warm, and the pulse small, regular, easily compressible, 126; respiration, 30; temperature, 100°.

The wound had been dressed regularly in the manner described three times a day. At 9 A.M. the dressing was changed, and a mixture of balsam of Peru and glycerin put in on gauze after the douching.

Stimulants were continued as before, but more freely. Coffee, 45 c.c., and clam-broth, 60 c.c., were given; also, liquid peptonoids.

At 8.30 A.M. 1.50 gramme of adrenalin was given hypodermically, and repeated at 9.40.

At 10 A.M. nearly two pints of normal salt solution were given under the skin, and a pint, containing adrenalin, at 6 P.M. Nitroglycerin and camphor were also injected at various times, together with brandy and strychnine.

Stimulants, as detailed above, were used freely all day.

3.30 P.M. Pulse growing weaker.

5 P.M. Oxygen given, and continued for some hours.

6.30 P.M. Last bulletin, No. 39:

Bulletin 39, 6.30 P.M. The President's physicians report that his condition is most serious in spite of vigorous stimulation. The depression continues, and is profound. Unless it can be relieved the end is only a question of time.

At 6.35 P.M., and again at 7.40, morphine was given hypodermically, as he was very restless and seemed to be suffering.

9 P.M. Heart-sounds very feeble.

The President continued to sink, becoming weaker and weaker.

At 10 P.M. the oxygen was discontinued. The heart-sounds were very feeble and consciousness lost.

The President died at 2.15 A.M., September 14th.

Drs. E. J. Janeway and W. W. Johnston, who, at the request of Dr. Rixey, had been summoned in consultation, arrived too late, but were present at the autopsy. Dr. McBurney also returned on Friday afternoon.

Sixth Urinalysis.

Color	amber, turbid, with phosphates.
Quantity	252 c.c.
Reaction	acid.
Specific gravity	1.023.
Albumin	mere trace, if any.
Urea	0.047 gm. per 1 c.c. of urine.
Indican	a trace.
E. phosphates	increased.
Chlorides	normal.
Sulphates	a little high.

Microscopical Examination. Microscopical examination of sediment obtained by centrifuge, before and after clearing, shows no change from yesterday's sample. Casts, hyaline and granular, both large and small, comparatively few. Cylindroids, a few. Crystals, large amount of uric acid, some sodium urate, and in the untreated specimen a large amount of amorphous deposit, principally of phosphates. There are a few epithelial cells, small, granular. Occasional red cells and leucocytes.

REPORT ON THE AUTOPSY.[1] BY HARVEY R. GAYLORD, M.D.,

Pathologist to the New York State Pathological Laboratory.

Ordinary signs of death: Ecchymosis in dependent portions of the body. Rigor mortis well marked. Upon the surface of the chest, to the right of the midsternal line, a spot 1 cm. in diameter, dark red in color, with a slight crust formation covering it, 5.5 cm. from the suprasternal notch; from the right nipple, 10 cm.; from the line of the right nipple, 8.25 cm. Surrounding this spot, at which point there is an evident dissolution of the continuity of the skin, is a discolored area of oval shape extending upward and to the right. In its greatest length it is 11 cm., and in its greatest width 6 cm. It extends upward in the direction of the right shoulder. The skin within this area is discolored, greenish-yellow, and mottled.

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[1] The autopsy was performed by Drs. Gaylord and Matzinger.

The surface of the abdomen is covered with a surgical dressing, which extends down to the umbilicus and upward to just below the nipples. The innermost layer of cotton is covered or stained with balsam of Peru and blood. On removing this dressing, a wound, parallel to and somewhat to the left of the median line, is exposed, inserted in which are two layers of gauze, likewise impregnated with balsam of Peru. The wound is 14.5 cm. in length, and is open down to the abdominal muscles. The layer of abdominal fat is 3.75 cm. in thickness. The appearance of the fat is good, a bright yellow in color. No evidence of necrosis or sloughing. In the left margin of the surgical wound, lying 1 cm. to the right of a line drawn from the umbilicus to the left nipple, 15.5 cm. from the nipple and 16.5 cm. from the umbilicus, is a partly healed indentation of the skin, and an excavation of the fat immediately beneath it (this is the site of the entry of the bullet), extending down to the peritoneal surface. On making the median incision, starting from the suprasternal notch and extending to a point just below the symphysis, the subcutaneous fat is exposed, which is of bright yellow color and normal in appearance, except in an area which corresponds superficially to the area of discoloration described as surrounding the wound upon the chest wall. This area marks the site of a hemorrhage into the subcutaneous fat. The remainder of the subcutaneous fat is firm, and measures 4.75 cm. in thickness on the abdominal wall. On opening the sheath of the right rectus muscle it was seen to be of dark red color. (Culture taken from ecchymotic tissue under the upper bullet hole and from between the folds of the small intestine. Three tubes from each locality on agar and gelatin.)

On opening the abdominal cavity the parietal surface of the peritoneum is exposed, and is found to be covered with a slight amount of bloody fluid; is perfectly smooth and not injected. The great omentum extends downward to a point midway between the umbilicus and the symphysis. It is thick, firm; its inferior border is discolored by coming in contact with the intestines. Below the umbilicus a few folds of intestine are exposed. These are likewise covered with discolored blood, after the removal of which the peritoneal surface is found to be shiny. On the inner aspect of the abdominal wound the omentum is found to be slightly adherent to the parietal peritoneum, and can be readily separated with the hand from the edge of the wound. At this point the omentum is somewhat injected. This adhesion to the omentum is found to extend entirely around the abdominal wound. The parietal peritoneum immediately adjacent to the inner aspect of the abdominal wound is ecchymotic.

On removing the subcutaneous fat and muscles from the thoracic wall, the point which marks the dissolution of continuity of the skin upon the surface is found to lie directly over the margin of the sternum and to the right side between the second and third ribs. There is no evidence of ecchymosis or injury to the tissues or muscles beneath the subcutaneous fat. On making an incision through the subcutaneous fat, directly through the wound upon the chest, a small cavity is exposed, about the size of a pea, just beneath the skin, which is filled with fluid blood. The subcutaneous tissue underlying the area of discoloration on the surface of the chest wall shows hemorrhagic infiltration.

On removing the sternum the lungs are exposed, and do not extend far forward. A large amount of pericardial fat is exposed. Pleural surface on both sides is smooth. There are no adhesions on either side within the pleural cavities. The diaphragm on the right side extends upward to a point opposite the third rib in the mammary line. No perceptible amount of fluid in either pleural cavity. On opening the pericardial cavity the surface of the pericardium is found to be smooth and pale. The pericardium contains approximately 6 c.c. of straw-colored, slightly turbid fluid. (Some taken for examination.)

On exposing the heart it is found covered with a well-developed panniculus. The heart measures, from the base to the apex on the superficial aspect, 10.5 cm. The right ventricle is apparently empty. The heart feels soft and flaccid. On opening the left ventricle a small amount of dark red blood is found. The muscle of the left ventricular wall is 1.5 cm. in thickness; dark reddish-brown in color; presents a shiny surface. The average thickness of the pericardial fat is 3.5 mm. (Cultures made from the auricle.) The left auricle contains but a small amount of dark, currant-colored blood. The mitral valve admits three fingers. The right ventricle, when incised in the anterior line, is found to be extremely soft; the muscular structure is 2 mm. in thickness. The panniculus measures 7 mm. The muscle is dark red in color, very shiny, and the pericardial fat invades the muscular wall at many points.

On opening the right auricle it is found to be filled and distended by a large currant-colored clot, which extends into the vessels. The tricuspid orifice admits readily three fingers. The coronary arteries are patulous and soft; no evidence of thickening.

Lungs are gray color, and contain a moderate amount of coal-dust pigment. Slight amount of frothy fluid escapes from the bronchi; but the pulmonary tissue is crepitant and free from exudate.

On unfolding the folds of intestine there is no evidence of adhesion until a point just beneath the mesocolon is reached, when, on removing a fold of small intestine, a few spoonfuls of greenish-gray, thick fluid flows into the peritoneal cavity.

On the anterior gastric wall is an area to which a fold of the gastrocolic omentum is lightly adherent. On breaking the adhesion there is found a wound about midway between the gastric orifices, 3.5 cm. in length, parallel with the greater curvature of the stomach, 1.5 cm.from the line of omental attachment. This wound is held intact by silk sutures. There is no evidence of adhesion at any other point on the anterior wall. The gastric wall surrounding the wound just mentioned for a distance of 2 cm. to 3 cm. is discolored, dark greenish-gray in appearance, and easily torn. On exposing the posterior wall of the stomach from above, along its greater curvature, the omentum is found to be slightly adherent, a line of silk ligatures along the greater curvature of the stomach marking the site where the omentum had been removed. On throwing the omentum downward the posterior gastric wall is exposed. On the posterior wall, a distance of 2 cm. from the line of omental attachment, is a wound approximately 2 cm. long, held intact by silk sutures. The gastric wall surrounding this wound is discolored. On the surface of the mesocolon, which is posterior to the gastric wall at this point, is a corresponding area of discoloration, the portion coming directly in contact with the wound in the gastric wall being of dull gray color. The remainder of the surface of the posterior wall of the stomach is smooth and shiny. Beyond the surgical wound in the posterior wall of the stomach is found an opening in the retroperitoneal fat large enough to admit two fingers. This opening communicates with a track which extends downward and backward as far as the finger can reach. The tissues surrounding this track are necrotic. On removing the descending portion of the colon a large, irregular cavity is exposed, the walls of which are covered with gray, slimy material, and in which are found fragments of necrotic tissue. Just at the superior margin of the kidney is located a definite opening, which forms the bottom of the track traced from the stomach. On stripping the left kidney from its capsule it is found that the superior portion of the capsule is continuous with the cavity. The weight of the left kidney is 5 oz., 1 g. The kidney is readily stripped from its capsule; is dark red; the stellate veins are prominent, and along its greater curvature are numerous dark red depressions. On the superior aspect of the kidney is a protrusion of the cortex, dark red in color, and in this protrusion is a laceration, 2 cm. long, extending across the superior border, approximately at right angles to the periphery of the kidney and from before backward. On incising the kidney the cortex and medulla are not easily distinguishable from one another; both are of rose-red color, the cortex measuring approximately 6 mm. in thickness. The vessels in the pyramids of Ferrein are very prominent. Beneath the protruding portion of the surface the cortex is dark red in color. This discoloration extends downward in pyramidal form into the medulla. The laceration of the surface marks the apex of the protrusion of the kidney substance. Between the spleen and the superior aspect of the kidney is a necrotic tract which extends down and backward and ends in a blind pocket. The tract which included the superior aspect of the kidney can be traced into the perinephritic fat to a point just above the surface of the muscles of the back.

The necrotic cavity which connects the wound on the posterior wall of the stomach and the opening adjacent to the kidney capsule is walled off by the mesocolon, and is found to involve an area of the pancreas, approximately 45 mm. in diameter, and extending about half through the organ. This organ, at its centre, forms part of the necrotic cavity. Through its body are found numerous minute hemorrhages and areas of gray softening, the size of a pea or smaller. These are less frequent in the head portion of the pancreas.

A careful examination of the track leading down toward the dorsal muscles fails to reveal the presence of any foreign body. After passing into the fat the direct character of the track ceases, and its direction can be traced no further. The adjoining fat and the muscles of the back were carefully palpated and incised without disclosing a wound or the presence of a foreign body. The diaphragm was carefully dissected away, and the posterior portion of the thoracic wall likewise carefully examined. All fat and organs which were removed, including the intestine, were likewise examined and palpated, without result.

The great amount of fat in the abdominal cavity and surrounding the kidney rendered the search extremely difficult.

The right kidney is embedded in a dense mass of fat; capsule strips freely; it weighs 5 ounces; measures 11.5 cm.; substance is soft; cortex is 6 mm. in thickness; rose-red in color; cut surface slightly dulled. There are a few depressions of the surface, and the stellate veins are prominent.

The liver is dark red in color; the gall-bladder distended. The organ was not removed.

The autopsy continued for a longer period than was anticipated by those who had charge of the President's body, and we were requested to desist seeking for the bullet, and terminate the autopsy. As we were satisfied that nothing could be gained by locating the bullet, which had apparently set up no reaction, search for it was discontinued.

Anatomical Diagnosis. Gunshot wound of both walls of the stomach and the superior aspect of the left kidney; extensive necrosis of the substance of the pancreas; necrosis of the gastric wall in the neighborhood of both wounds; fatty degeneration, infiltration, and brown atrophy of the heart muscle; slight cloudy swelling of the epithelium of the kidneys.

A matter of no inconsiderable embarrassment to us arose in the objection to our removing sufficient portions of the tissues for examination. We were able to secure only two small fragments of the stomach wall; tissue from around the wound upon the chest wall; a portion of fat from the wall of the necrotic cavity; a small piece of each kidney, that of the left kidney including the portion involved by the original wound; and pieces of heart muscle from the right and left ventricles. The microscopical examination of these tissues follows:

The piece of retroperitoneal fat, where it forms part of the necrotic cavity, is seen on section to be covered with a thick gray deposit, which has an average thickness of from 4 mm. to 6 mm. Beneath this, and separating it from the fat, is a well-defined area of hemorrhage, from 1 mm. to 2 mm. in thickness. The appearance of this piece of tissue is characteristic of the fat tissue surrounding the entire cavity. A section made perpendicular to the surface, and stained with hæmatoxylin-eosin, shows the following characteristics: Under low power there is no evidence of round-celled infiltration between the fat cells or of fat necroses. The surface of the tissue, which in the microscopical specimen was covered by a layer of grayish material, proves, under low power, to consist of a partly organized fibrinous deposit. At the base of this deposit is evidence of an extensive hemorrhage, marked by deposits of pigment. The surface of the membrane is of rough and irregular appearance, and contains a large number of round cells, with deeply stained nuclei. Under high power the organization of the membrane may be traced from the base toward the surface. The portion immediately adjacent to the fat tissue consists of a network of fibrin inclosing large numbers of partly preserved red blood-corpuscles. In many areas the red blood-corpuscles are broken down, and extensive deposits of pigment are found. Extending into the fibrin structure of the membrane are numerous typical fibroblasts and round cells. In some regions pigment is evidently deposited in the bodies of large branching and spindle cells. Here and there, included in the membrane, are the remains of fat cells, and toward the surface of the membrane a large number of round cells scattered through the interstices of the membrane. There are but few polymorphonuclear leucocytes. Here and there in the membrane are fragments of isolated fibrous connective tissue, with irregular contours and an appearance suggesting that they are fragments of tissue which have been displaced by violence and included in the fibrin deposit. The fibrin in the superficial layers of the membrane is formed in hyaline clumps. The organization along the base of the deposit is comparatively uniform.

Sections stained with methylene blue, carbol-thionin, and Gram's method were carefully examined for the presence of bacteria, with negative results. Even upon the surface of the membrane there are no evidences of bacteria.

The section of the left kidney including the triangular area of hemorrhage described in the macroscopical specimen reveals the following appearances. (section hardened in formalin, stained with hæmatoxylin-eosin): Examined macroscopically, section represents a portion of a kidney cortex made perpendicular to the surface of the cortex, and including an area of hemorrhage into the substance of the cortex 1 cm. in length, measured from the capsular surface downward, and presenting a width of from 5 mm. to 6 mm. The capsular surface has apparently been torn.

Under low power the margins of the preparation are found to consist of well-preserved kidney structure. There is a slight amount of thickening of the interstitial tissue, and occasional groups of tubules are affected by beginning cloudy swelling. The glomeruli are large, and present a perfectly normal appearance. As we approach toward the centre of the preparation occasional glomeruli are met with in which the capillary loops are engorged, and the adjacent tubules contain red blood-corpuscles. A short distance further the kidney structure becomes entirely necrotic. Here and there the remains of tubules may be made out, and these are infiltrated with cells. The necrotic area presents a rough, net-like structure. As we approach toward the surface of the kidney we find that the necrosis becomes more marked. There is the merest suggestion of kidney structure, its place being taken by disintegrated red blood cells and leucocytes, embedded in a well-defined fibrinous network. There is great distortion of the kidney structure about the periphery of the necrotic area. In this region a considerable amount of pigment is also found in the necrotic tissues.

Under high power the characteristics of the necrotic tissues may be better observed. The kidney structure is broken up and torn into irregular fragments, infiltrated by red blood-corpuscles and leucocytes. In the portion of the necrotic mass beneath the capsule the kidney structure is practically obliterated and is replaced by a network of fibrin, which includes large numbers of red blood cells and leucocytes. Scattered through the entire necrotic area are frequent deposits of pigment. In the deeper portions of the necrotic area the margins of the fibrin deposit are invaded by fibroblasts from the connective tissue structure of the kidney. The organization in these areas is, however, slight.

Sections stained with methylene blue and Gram's method, and carefully examined under oil immersion, fail to reveal the presence of any organisms. In preparations stained with methylene blue the deposits of pigment may be readily observed. Section of the same tissue hardened in Hermann's solution and examined for fat shows the presence of numerous fat droplets within the epithelium of the tubules which are adjacent to the area of necrosis. In the portions of the preparation more widely distant from the area of necrosis no fat is present.

Section of the right kidney hardened in formalin and stained with hæmatoxylin-eosin reveals the presence of areas in which slight parenchymatous degeneration of the epithelium in the uriniferous tubules may be noted. These areas are not extensive, and are confined to single groups of tubules. The interstitial connective tissue of the organ seems to be slightly increased in amount, but there is no well-defined round-celled infiltration. An occasional hyaline glomerulus is to be met with in these cases, surrounded by increased connective tissue. The epithelium of the kidney tubules, aside from those in which the parenchymatous degeneration is present, is well preserved. The nuclei are well stained; protoplasm finely granular.

A fragment of the stomach wall taken from the immediate neighborhood of the anterior wound is in a condition of complete necrosis. The nuclei of the cells are scarcely demonstrable. The epithelial surface is recognized with difficulty. At its base are apparently a few round cells. Examination of the bloodvessels reveals nothing characteristic. There is apparently no evidence of thrombosis A section made through the gastric wall at some distance from the wound reveals the well-preserved muscular structure of the gastric wall, which presents no characteristic alterations. Superficial portions of the epithelium have apparently been affected by post-mortem digestion. However, in one portion of the preparation the epithelium is intact, and shows distinct evidence of marked round-celled infiltration between the glandular structures. The bloodvessels contained blood-corpuscles, with the usual number of leucocytes.

The fragments of heart muscle which were removed from the right and left ventricular walls were examined in the fresh state, and exhibited a well-defined fatty degeneration of the muscle fibres, and in the case of the right ventricular wall an extensive infiltration between the muscle fibres of fat was apparent. Sections from these fragments of muscle hardened in Hermann's solution are taken for examination. A fragment of muscle from the right ventricular wall was removed at a point where the fat penetrated deeply into the muscular structure, the ventricular wall at this point showing an average thickness of 2.5 mm. Under low power the muscle fibres are separated into bundles by masses and rows of deeply stained fat cells. The muscle fibres are seen to contain groups of dark brown granules lying in the long axis of the cells. Under high power these are resolved into extensive groups of dark brown pigment arranged around the nuclei. The muscle fibres are slender, the cross and longitudinal striation is well-defined. Examined near the margin of the preparation, where the osmic acid fixation has been successful, all of the muscle fibres are found to contain minute black spherical bodies, extending diffusely through all the muscle fibres about the entire margin of the preparation. These fine fat droplets are present in sufficient amount to speak of an extensive diffuse fatty degeneration of the muscle fibres. Where the large fat cells have separated the muscle fibres these are found to be more atrophic than those in the central portions of the larger bundles.

The examination of the section through the healed bullet wound on the chest walls reveals nothing of importance. The dissolution of continuity is filled in by granulation tissue, and there is evidence of beginning restoration of the epithelium from the margins. Stains for bacteria give negative results.

In summing up the macroscopical and microscopical findings of the autopsy the following may be stated: The original injuries to the stomach wall had been repaired by sutures, and this repair seems to have been effective. The stitches were in place, and the openings in the stomach wall effectually closed. Firm adhesions were formed both upon the anterior and posterior walls of the stomach, which reinforced these sutures. The necroses surrounding the wounds in the stomach do not seem to be the result of any well-defined cause. It is highly probable that they were practically terminal in their nature, and that the condition developed as a result of lowered vitality. In this connection there is no evidence to indicate that the removal of the omentum from the greater curvature and the close proximity of both of these wounds to this point had any effect in bringing about the necrosis of the gastric wall, although circulatory disturbances may have been a factor. The fact that the necrotic tissue had not been affected by digestion strongly indicates that the necrosis was developed but shortly before death. The excavation in the fat behind the stomach must be largely attributed to the action of the missile. This may have been the result of unusual rotation of a nearly spent ball, or the result of simple concussion from the ball passing into a mass of soft tissues. Such effects are not unknown. The fact that the ball grazed the superior aspect of the left kidney, shown by the microscopical investigation of that organ, indicates the direction of the missile, which passed in a line from the inferior border of the stomach to the tract in the fat immediately superior to the kidney. There was evidence that the left adrenal gland was injured.

The injury to the pancreas must be attributed to indirect, rather than direct, action of the missile. The fact that the wall of the cavity is lined by fibrin, well advanced in organization, indicates that the injury to the tissues was produced at the time of the shooting. The absence of bacteria from the tissues indicates that the wound was not infected at the time of the shooting, and that the closure of the posterior gastric wound was effectual. The necrosis of the pancreas seems to us of great importance. The fact that there were no fat necroses in the neighborhood of this organ indicates that there was no leakage of pancreatic fluid into the surrounding tissues. It is possible that there was a leakage of pancreatic fluid into the cavity behind the stomach, as the contents of this cavity consisted of a thick, grayish fluid, containing fragments of connective tissue. In this case the wall of fibrin would have been sufficient to prevent the pancreatic fluid from coming in contact with the adjacent fat. The extensive necrosis of the pancreas would seem to be an important factor in the cause of death, although it has never been definitely shown how much destruction of this organ is necessary to produce death. There are experiments upon animals upon record in which the animals seem to have died as a result of not very extensive lesions of this organ. One experiment of this nature reported by Flexner (*Journal of Experimental Medicine*, vol. ii.) is of interest. The fact that concussion and slight injuries of the pancreas may be a factor in the development of necrosis is indicated by the researches of Chiari (*Zeitschrift für Heilkunde*, 1896, vol. xvii., and *Prager med. Wochenschr.*, 1900, No. 14), who has observed (although a comparatively rare condition) extensive areas of softening and necrosis of the pancreas, especially of the posterior central portion which lies directly over the bodies of the vertebra, where the organ is most exposed to pressure or the effects of concussion. The wound in the kidney is of slight importance, except as indicating the direction taken by the missile. The changes in the heart, as shown by the macroscopical inspection and the microscopical examination, indicate that the condition of this organ was an important factor. The extensive brown atrophy and diffuse fatty degeneration of the muscle, but especially the extent to which the pericardial fat had invaded the atrophic muscle fibres of the right ventricular wall, sufficiently explain the rapid pulse and lack of response of this organ to stimulation during life.

REPORT ON THE BACTERIOLOGICAL EXAMINATION. BY HERMAN G. MATZINGER, M.D.,

Bacteriologist to the New York State Pathological Laboratory.

It is obvious that the short space of time which has elapsed since the death of the President has hardly been sufficient to prepare a complete and thorough bacteriological report. This report contains all the observations which have been made up to this time.

On September 11th, during the life of the President, cultures were made by Dr. Wasdin from the base of the abdominal wound and from dressings removed at the same time. These were submitted to me for examination, and showed the presence of the ordinary pus organisms: Staphylococcus pyogenes aureus and staphylococcus cereus albus, with a gas-forming bacillus which, in pure anaërobic culture on glucose gelatin, forms small, pearly, translucent colonies, with no liquefaction. In litmus milk it produces acid, but no coagulation. Morphologically, it is apparently a capsulated, short bacillus, which takes stain poorly and which does not stain by Gram's method. Inoculated into the ear vein of a rabbit, which was killed immediately afterward, it produced, after twenty-four hours in the body of the rabbit, a marked accumulation of gas in the organs, and again grew out in pure culture. As yet the organism is not fully identified.

None of these cultures showed streptococci. A bacterium which appears to be one of the proteus group was, however, isolated, which does not stain by Gram and appears in varying forms, sometimes small, oval, and again quite rod-shaped and in short chains. Sometimes it is surrounded with a slimy covering, which remains clear like a capsule when the organism is stained. On slanting agar it produces a whitish, slimy growth, which gradually runs to the bottom of the slant and produces an odor of decomposition.

On gelatin it grows very slowly, with slight and slow indication of liquefaction. In litmus milk it produces acid and rapid coagulation.

At the time of the autopsy, September 14th, inoculations were made by myself. From the base of the wound there was again obtained a number of pus organisms, principally a white staphylococcus and the bacterium described above, but no streptococci. Cultures made from the peritoneal surface of the intestines were entirely negative. Cultures made from the under surface of the omentum, near the colon, were entirely negative, both with and without oxygen. Cultures from the blood of the right auricle were likewise negative. A very careful and extensive search for micro-organisms in the contents of the necrotic cavity behind the stomach reveals nothing but a short, stumpy bacterium, which, as far as the work has been carried at present, appears to belong to the proteus group, and is very like proteus hominis capsulatus, described by Bordoni and Uffreduzzi.

Morphologically, it is not uniform, and sometimes appears almost encapsulated, being surrounded by material that does not stain, is quite refractory to Gram, and produces an odor of decomposition as it grows. It does not liquefy gelatin rapidly, and grows slowly as a glistening, white elevated surface growth, which slowly sinks; but on agar, in the thermostat, it grows very rapidly as a moist, grayish-white, translucent mass. Colonies on gelatin plates have a clean circumference, are granular, and quite refractive. In litmus milk it produces acid and rapid coagulation. Animal experiments are still incomplete and cannot be published at this time.

It must be stated that there is occasion for suspecting that this may be a contamination, either from the outer wound or elsewhere, because, quite unavoidably, the technique of obtaining the material and cultures from the necrotic cavity was not absolutely correct.

Cultures made from the small area of broken-down tissue under the chest wound at the time of the autopsy grew what appears to be staphylococcus epidermidis albus described by Dr. Welch.

The slimy, gray necrotic material from the cavity above the transverse mesocolon behind the stomach was carefully examined microscopically, with the result that very few micro-organisms were found in the fresh state, and no recognizable tissue elements of any kind, no leucocytes or pus-corpuscles, but an abundance of crystals, which appeared more like fatty acid than fat crystals. It contained no free hydrochloric acid, and was alkaline in reaction. Experiments as to its digestive power were negative. About 2 c.c. of this material was injected in the space behind the stomach of a dog (still living), with no results except quite an elevated temperature for three or four days. Other animal experiments are also incomplete.

It might be well to state here that the bacteriological examination of the chambers and barrel of the weapon used, as well as the empty shells and cartridges, ordered by the District Attorney, was entirely negative, except that from a loaded cartridge there was grown an ordinary staphylococcus and a mould. The chemical examination of the balance of the loaded cartridges, made by Dr. Hill, chemist, was also negative.

The absence of known pathogenic bacteria, particularly in the necrotic cavity, warrants the conclusion that bacterial infection was not a factor in the production of the conditions found at the autopsy.

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AN EPIDEMIC OF NOMA; REPORT OF SIXTEEN CASES.

By George Blumer, M.D.,
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Noma is a disease characterized by rapidly developing gangrenous sloughing with frightful destruction of tissue. It is observed almost exclusively in children, and especially betweeen the ages of three and eight.

It fortunately occurs so rarely that many a physician with a large practice never has seen a case, and in large clinics its occurrence is a rarity. Allchin reports that during seven years there were in the East London Hospital for Children only five cases out of a total of 6364 admitted, and that during thirteen years there were only six cases out of a total of 13,000 admitted to the Hospital for Sick Children.

Its place of predilection is the mucous membrane of the mouth—gum or cheek. In its rapidly destructive progress it quickly attacks the periosteum, which soon undergoes gangrenous change, while the greater part of the cheeks, the upper and lower lips, and the eyelids may be destroyed with complete exposure of the mouth and pharynx. This gangrenous process may, however, though much more rarely, affect other parts of the body with the same destructive effect, and cases of noma involving the genitals and ears have been occasionally observed.

The exhaustion which results directly from this great destruction of tissue is so marked that few cases recover. Bruns gives a mortality of 70 per cent. in 413 cases, and Rilliet and Barthez a mortality of 95 per cent. in 21 cases.

It is said to occur in children recovering from acute disease when the sanitary conditions are bad. Henoch attributes to poor food, lack of cleanliness, and unhealthy, damp dwellings the principal predisposing causes, and with such conditions he has seen it follow bronchitis, pneumonia, and dysentery, especially in children with tuberculous tendencies. Measles, scarlet fever, and typhoid are the pathological conditions in the wake of which this disease most commonly develops, and of these measles has been most frequently observed as the precursor.

Osler claims that at least one-half of the cases develop during the convalescence of measles, while Krahn, in an able paper in the *Mittheilungen aus den Grenzgebieten der Medicin und Chirurgie*, 1900, Heft 4 und 5, records 55 out of 133 cases as developing after measles.

Bouley and Caillant found that measles was the antecedent in 41 out of 46 cases.

In April, 1900, an epidemic of measles occurred at the Albany Orphan Asylum, an institution which cares for 450 children of both sexes, ranging in age from two to fifteen years. The type of disease was severe. Among the 173 cases of measles 32 had complications, twelve had pneumonia, five had pneumonia and gangrene, eleven had noma without other complication, four had lesions which were considered to be beginning noma, but in which the process was stopped in its incipiency by thorough cauterization under chloroform.

Of the twelve cases of pneumonia two died; the five children with pneumonia and gangrene all died, while two only of the eleven cases of noma without other complication died.

Of the sixteen cases of noma the mouth alone was affected in four cases, the mouth and other parts, the ear, and vulva in three cases; the vulva alone was attacked in two children, and in seven with other parts. The gangrene involved the rectum alone in three children, and with gangrene of other parts in five children.

Of the fatal cases noma involved the mouth in three children and the rectum in four children. Pneumonia was, however, the direct cause of death in five of these cases, and in the two patients where no pneumonia was present one had noma of the mouth and the other noma of the rectum.

The ages of the children affected ranged from three to twelve years. Two were in their fourth year, five in their fifth, three in their sixth, four in their seventh, one each in the eighth and ninth, three in the tenth, and one in the eleventh, twelfth, and thirteenth years respectively.

The exciting cause of this series of cases is evident, but the predisposing cause is not so apparent. Poor food, unhealthy, damp dwellings, and lack of cleanliness are usually given as the predisposing causes.

This institution is situated on high ground in a very healthy section of the city, with considerable surrounding space. It consists of a main building of brick, three stories and basement, and three pavilions of wood—two, two stories and basement, and one, one story and basement.

The basement of the main building is occupied by the kitchen, dining-rooms, and bath-rooms. The basements of two of the wooden pavilions were used as school-rooms for about half the boys and girls. Heating is by hot-air furnaces and stoves. Although there were no cellars underneath, no noticeable dampness was evident. All the children slept in the first and second stories. The boys played out-of-doors, while the girls took their exercise in the basement of one of the pavilions.

The character of the food was closely examined, and, although there seemed to be a lack of variety, its nutritive value was high. The average age of the children is eight years, and they were considered each to require 0.5 of the food of a man, or 1750 calories, one-quarter of this amount being taken at breakfast and supper and one-half at dinner. The breakfast consists of coffee (malted barley roasted), milk, sugar, and bread; the dinner of a beef and vegetable stew and bread; the supper of coca, milk, sugar, bread, and cookies.

There has never been any evidence of lack of cleanliness, and the plumbing throughout is excellent. It can, I believe, be truthfully said that the lodging, food, and care of these children are much superior to that which many children of the poor receive in our large cities. That the general hygienic and dietetic conditions have been excellent is evidenced by the fact that the mortality for the last eight years has averaged 19.4 per thousand, and in 1899, the year preceding this epidemic, there were but four deaths for the entire year.

This occurrence of sixteen cases of noma would seem to be entitled to be called an epidemic. That epidemics of noma occur has been generally denied, and in the epidemics reported in the seventeenth, eighteenth, and early part of the nineteenth century the diagnosis is now questioned. The fact, however, that it occurs in institutions in groups indicates its specific character. Savard[1] and Poupart[2] saw an epidemic of noma in the old Hotel Dieu, Paris, in 1699. Martin[3] noted its occurrence in the Charity Hospital of Lyon in 1796, and considered the ravages of the Revolution as an etiological factor. Lund,[4] of Stockholm, in 1765, observed the development of two cases in children kept in a damp room with hygienic surroundings. Cliet[5] reports eight cases in the General Hospital of Lyon, in 1817. Baron[6] saw, in 1816, cases among infants in the Foundling Hospital of Paris. Luming[7] describes two cases of noma occurring in the Institute for Children's Diseases,

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[1] Nouveau recueil d'observations chirurgicales, Paris, 1702.

[2] Historie de l'académie royale des sciences, année, 1699.

[3] Recueil dec actes de la Société de Lyon, 1798.

[4] Der K. Schwedischen akademie der Wissenschaften Abhandlungen, 1765.

[5] Compte-Rendu medico-chirurgicale, Lyon, 1823.

[6] Journal de Médecine, T. xxxvi., 1816.

[7] Dublin Hospital Reports, vol. iv., 1827.

Dublin, in 1824. Ryland[1] observed, after an epidemic of measles in Birmingham, in 1837, eight cases of noma of the cheek and three of noma of the genitals. Barthez and Rilliet[2] declare, as a result of the study of the literature and their own experience, that it is not contagious, although they do not think that point completely settled. d'Espine-Picot[3] claims that it is not contagious. Richter[4] could not find a cause in the diet, cleanliness, or nursing, and believes it was due to a miasma. Loschner[5] observed in the Lazarus Child's Hospital in Prague the repeated occurrence of noma in the room where the first noma case occurred. Bruns[6] believes that the miasmatic or contagious origin and development has not been determined with sufficient certainty. Gierke reports twenty cases of noma occurring in the Child's Hospital in Stettin during seventeen years. Six of these cases developed after the admission of two cases of noma. The general hygienic conditions were good, and he believes it was impossible for it to have been due to such conditions. During an epidemic of measles in the New York Foundling Asylum, in 1891, seven cases occurred among 165 children sick with measles. The misuse of mercury was supposed, however, to have had much influence in inducing this complication.

In the sixteen cases here reported all the cases developed in the girls' dormitory, except two cases in boys who were in the infirmary, where cases of gangrene were being treated. Although there were almost twice as many cases of measles among the boys as among the girls, no cases of noma developed in their dormitory. The first case was detected by the putrid odor coming from the patient. An examination then revealed that the vulva was gangrenous. This process rapidly extended to the rectum, with complete destruction of the intervening tissue. After the discovery of this case the children were carefully examined. The other cases developed in this dormitory where there was the possibility of contagion by soap, towels, etc., and none in the boys' dormitory, although they were under precisely the same hygienic conditions. It was noted, also, that after the cases were thoroughly isolated no new cases developed.

The disease began with a slight ulceration of the mucous membrane with a surrounding area of intense hardness. This quickly became dark, with a dark, brownish-red border, broke down, and had a most offensive odor. The process was in some cases frightfully rapid, so that the tissue seemed to necrose *en masse.* No complaint of pain was made by the children, and the washing and dressing of the ulcerated surfaces did not cause distress.

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[1] Lancet, 1838, vol. ii

[2] Manuel Pratique des Maladies de l'Enfance.

[3] Heckars literar Annal, 1829.

[4] Vierteljahrschrift f. d. prakt Heilkunde, 1847.

[5] Die chirurg. Pathologie u. Therapie des Kan. u. Geschmacksorgans, Tübingen, 1859.

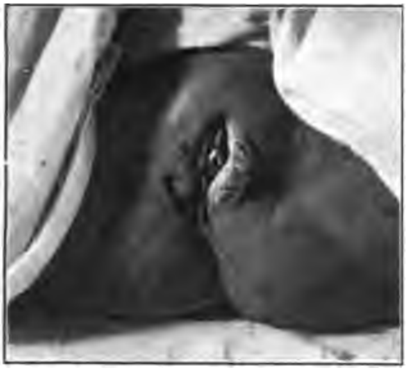
[6] Jahrbuch f. Kinderheilkunde, 1868.

The general treatment was stimulating—alcohol, iron, quinine, strychnine, nitroglycerin, and concentrated nourishment. The local treatment was cleanliness, frequent douching with 50 per cent. boric acid solution, then with pure hydrogen dioxide, and constant wet dressings of Labarraque's solution. Where the destruction was not too extensive thorough cauterization under chloroform with the Paquelin cautery seemed to stop the progress of the gangrene, and in four cases not counted in this series the cauterization so completely stopped the process as to render the diagnosis doubtful.

The following histories are typical of the cases observed:

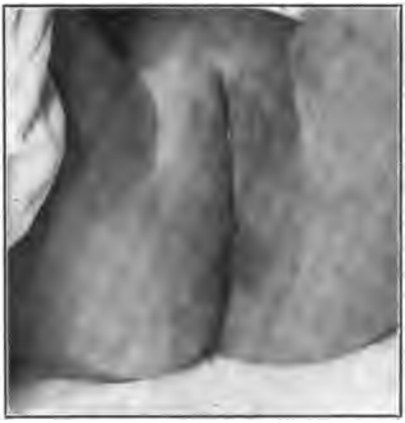
I. B., aged three years, a girl. Family history unknown. (Figs. 1 and 2.) Several days after the disappearance of the rash of measles gangrenous ulcerations were found on both labiæ majora, with a surrounding areola of hard infiltrated tissue. The labiæ were markedly swollen. Thorough cauterization under chloroform with the Paquelin cautery stopped the progress of the gangrene, and the ulceration healed under the use of zinc ointment.

FIG. 1.



Noma affecting both labia majoræ.

FIG. 2.

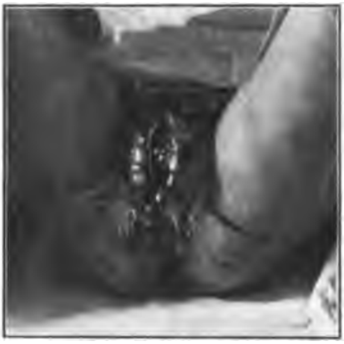


Condition present one year later.

The temperature was above 101° F. on only two days, and after ten days remained normal. The pulse ranged from 96 to 136, and was weak.

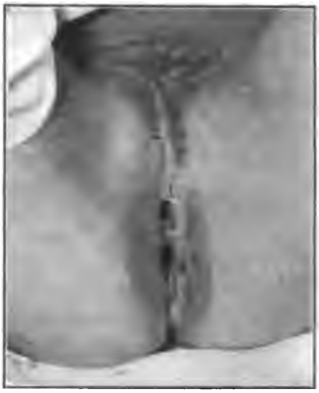
J. B., aged six years, a girl. Family history unknown. (Figs. 3 and 4.) A week after the disappearance of the rash a slight ulceration, with a surrounding hard infiltration, was found on the posterior aspect of the vulva. This ulceration gradually extended toward the rectum. The vulva then became much swollen and had a dark, reddish hue. The inflammation extended on all sides two inches beyond the vulva. After a week, during which time the condition seemed stationary, the inflamed area sloughed off *en masse.* (The photograph was taken just before the sloughing occurred.) The temperature was normal or subnormal, and the pulse very weak and irregular. After the sloughing the wound healed rapidly. There is now a constant discharge of fecal matter through the vagina.

FIG. 3.



Noma affecting the vulva and rectum.

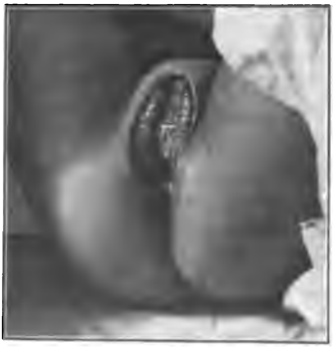
FIG. 4.



Condition present one year later. Fecal incontinence per vaginam.

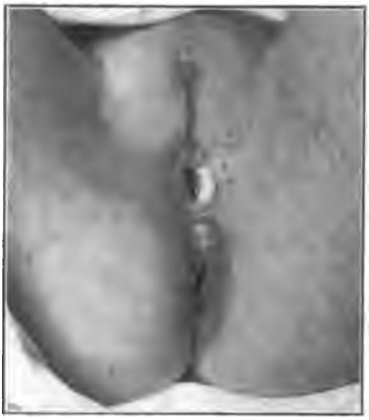
K. K., aged seven years, a girl. Family history unknown. (Figs. 5 and 6.) Six days after a mild attack of measles a putrid odor was detected, which, upon examination, was found to come from a gangrenous ulceration of the vulva. The centre of the ulcerated area was

FIG. 5.



Noma affecting the vulva and rectum.

FIG. 6.



Condition present one year later.

black, and the surrounding tissue hard and of a dark, brownish color. The process rapidly extended to the rectum, and there was a complete sloughing of all the intervening and surrounding tissue.

The temperature did not go above 100° F., and the pulse was of good quality and ranged from 84 to 106.

L. B., aged three and one-half years, a boy. Family history unknown. Had an attack of measles, with high fever. He became much prostrated, tonsils were enlarged and ulcerated, and there was marked dyspnœa. Dulness with bronchial breathing was discovered over both lungs. Gangrene of the rectum was detected ten days after the occurrence of the measles. Two days later the mouth and tonsils were found to be gangrenous. After three days the patient died, and the autopsy was made by Dr. Blumer.

The bacteriology of noma has been the subject of a number of researches, each, as a rule, bearing only on one or two cases.

Froriep[1] seems to have been the first to describe parasites in this condition. He figures certain large cells between the muscle fibres, which he considers a form of yeast, but which some later observers interpret as mastzellen.

Schimmelbusch[2] later described in a single case bacilli, at times short, at times appearing in long threads, which were present in the gangrenous tissue in large numbers. They decolorized by Gram. He was able to cultivate them with ease on all kinds of media. Lingard[3] describes similar bacilli in one case.

Grawitz[4] in a single case observed bacilli which grew into long threads at the junction of the necrotic and healthy tissue. They stained by Gram.

Ranke[5] describes cocci in sections from cases which he studied. He made no cultures.

Bartels[6] studied two cases microscopically. In the depths of the necrosed tissue he found in both cases innumerable long, slim bacilli. In one case he notes the thread-like forms. He states that spores were to be made out. The organisms stained by Gram. He made no cultures.

Guizetti,[7] and Babes and Zambilovici,[8] in four cases describe short, thick bacilli with pointed ends, facultative anaërobes, which grew on various media. They stained by Gram's and Weigert's methods in sections, but not in pure culture. Elder[9] also describes bacilli with pointed ends, which might be similar as far as can be judged from his description.

Foote[10] describes long bacilli, at times forming chains, which stained by Gram if decolorization was not carried too far. He was unable to cultivate the organism, but isolated pus cocci (staphylococcus aureus, streptococcus pyogenes, micrococcus cereus albus).

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[1] Chirurgische Kupfertafeln, 1844, p. 458.

[2] Deutsch. medicinische Wochenschrift, 1889, Bd. xv. p. 516.

[3] Lancet, London, 1888, vol. ii.

[4] Deutsch. medicinische Wochenschrift, 1890, p. 318.

[5] Jahrbuch für Kinderheilkunde, 1888, Bd. xxvii.

[6] Ueber Noma. Inaugural Dissertation, Göttingen, 1892.

[7] Policlinico, September-October, 1896.

[8] Annales de Pathologie et Bacteriologie de Bucarest, 1895, vol. v.

[9] Edinburgh Medical Journal, September, 1894.

[10] THE AMERICAN JOURNAL OF THE MEDICAL SCIENCES, 1893, vol. cvi.

Nikolaysen[1] found cocci and bacilli in two cases. He was able to cultivate the latter.

Schmidt[2] describes one case in which he was able to cultivate only cocci. In sections he found a mixture of organisms near the surface of the slough, but deep down only slim bacilli. They showed thread-like forms and stained by Weigert, but only faintly by Gram.

Petruschky[3] in one case found diphtheria bacilli, with organisms which he describes as vibrios, and also spirilla. He cultivated only the diphtheria bacilli, and considered them the cause of the process.

Perthes[4] describes in two cases an organism of the streptothrix variety, which he was able to grow anaërobically, but which he did not isólate in pure culture. Krahn doubts that true branching existed in these organisms.

Saft[5] describes cocci and bacilli which he cultivated from one case. The latter he describes as diphtheria-like.

Krahn[6] examined two cases, and found in the deeper parts of the necrotic zone thread-like bacteria, which he compares in appearance with the spirillum sputigenum and the spirochæte dentium. He was unable to cultivate them in ordinary media or in tubes where air was excluded by means of paraffin. From their similarity in appearance to certain mouth organisms he suggests that they are merely mouth organisms exalted in virulence.

To sum up these findings it may be stated that in practically all cases the superficial parts of the slough showed, as would be expected, mixed cultures; in the deeper parts, on the other hand, the sections often showed almost a pure growth. The organisms most frequently found were slim, thread-like bacteria, decolorizing rather easily by Gram and not growing on ordinary media.

In a few cases, as those of Schimmelbusch and Lingard, thread-like organisms easily cultivated were described. In other cases organisms obviously differing entirely from these thread-like forms are described.

Nine of the sixteen cases occurring in the Albany Orphan Asylum were examined. They were selected as cases which showed all the different stages of the process.

The examination included cover-slip examinations in all cases, and cultures on blood serum, agar, and bouillon grown aërobically and also in the Buchner jar.

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[1] Cited by Krahn.

[2] Jahrbuch für Kinderheilkunde, 1898, Bd. xlviii.

[3] Deutsch. medicinische Wochenschrift, 1898, No. 15.

[4] Verhandlung d. Deutsch. Gesellsch. für Chirurgie, XXVIII. Kongress.

[5] Ueber Noma Inaugural Dissertation, Halle, 1898.

[6] Mittheilungen aus den Grenzgebieten der Medicin und Chirurgie, 1900, Heft 4 und 5.

The result of the bacteriological examination of the nine cases can be briefly summarized as follows:

In all cases one organism and one alone was constantly present in large numbers in cover-slips. This was an organism which in smears took the form of a leptothrix. It averaged one-half micron in breadth, and varied from five to twenty microns or even more in length. The short forms were usually bent, the long forms curled or wavy. The organism stained rather poorly with gentian violet, much better with carbol-fuchsin. It did not decolorize by Gram, though it stained faintly by his method. It showed no branching. In smears from the early cases this was almost the only organism present. As the process grew older the cover-slips showed a greater mixture of organisms. Those from the later stages showed beside the thread-like organism, short, thick bacilli decolorizing by Gram, and also cocci either in groups or chains which did not decolorize by Gram. All of the cultures failed to show the thread-like organism. The colon bacillus was present in all cases, as were some of the pus cocci, the streptococcus pyogenes occasionally, much more commonly the staphylococcus aureus.

Of the cases which died we were able to procure an autopsy on but one, a boy, in which the gangrenous process surrounded the anus. The cause of death was a capillary bronchitis with extensive bronchopneumonia due to the streptococcus pyogenes. In this case cover-slips taken from the deep portion of the necrosed area showed only the long, thread-like organisms and cultures, both aërobic and in Buchner's jars, were absolutely sterile. The following is the description of the microscopic lesions:

The lesion occupies the skin around the anus and the subjacent fat and connective tissue. The sections show that the entire skin and the subjacent tissue for some depth beneath it are completely necrotic. Every tissue in the necrotic area is totally devoid of nuclei, and no nuclear fragments are to be made out. In sections stained with hæmatoxylin and eosin bluish masses of bacteria can be seen. Between this necrotic area and the healthy tissue is a narrow zone showing inflammatory reaction. The fat and connective tissue in this zone are infiltrated with polynuclear leucocytes. These are only moderate in number. There is absolutely no sign of regenerative changes in the affected tissues. Sections stained by Gram's method show in the superficial portions of the necrotic zone a variety of bacteria; many are cocci in pairs and chains, and there are many long thread-like forms faintly stained. Sections stained with eosin and methylene blue show that many short bacilli are also present. The deeper parts of the necrotic area show a single organism which is also present in the zone of reaction, and to a slight extent in the healthy tissue. It is seen best in sections stained in carbol-fuchsin and decolorized by oil of cloves, according to Flexner's method.

It presents exactly the same appearance as the organism which was constantly present in cover-slips from all the cases. In the deeper part of the necrotic zone the organism is present in enormous numbers. The individual bacteria are nearly always seen as very long threads, which for the most part lie parallel to and between the fibrillæ of the connective tissue. The organisms follow with remarkable fidelity the wavy arrangement of the connective tissue fibrils in many instances. This is not always the case, for a good many shorter forms are seen which run crosswise to the connective tissue fibrils. The number of organisms in the reactionary zone is much less than that in the necrotic zone, and there is a gradual diminution in number as the healthy tissue is approached, though a small number of the organisms are found in apparently unaltered tissue.

As a result of this investigation and of an analysis of the literature, it must be concluded that noma, while originating in all probability as a simple infection, is always in its later stages a mixed infection, and that, while it is probably not always due to the same organism, it is most frequently due to a long thread-like organism of the leptothrix type, which does not grow upon ordinary culture media. Krahn's assumption that it is due to mouth organisms is negatived by finding similar organisms in noma of the genitalia.

SOME NEW POINTS IN REGARD TO RAYNAUD'S DISEASE.

By Carl Beck, M.D.,
of New York.

That the tissue changes in Raynaud's disease are not confined to the soft tissues, but also affect the bones, can be well demonstrated by the Röntgen rays. The following cases may serve as an illustration :

Case I.—A woman, aged forty-two years, who had been well until fourteen years ago, noticed a slight pain in the index finger of her left hand. At the same time there was a marked pallor of the whole finger. Four months after the sudden onset of the pain repeated congestion was observed in the region of the second and third phalanx of the same finger, which continued until about six months after the onset of the first symptoms. The tip of the finger became dry and black. Amputation was then performed. The patient regained and kept her health until six months ago, when the same pain and pallor extended symmetrically over both hands.

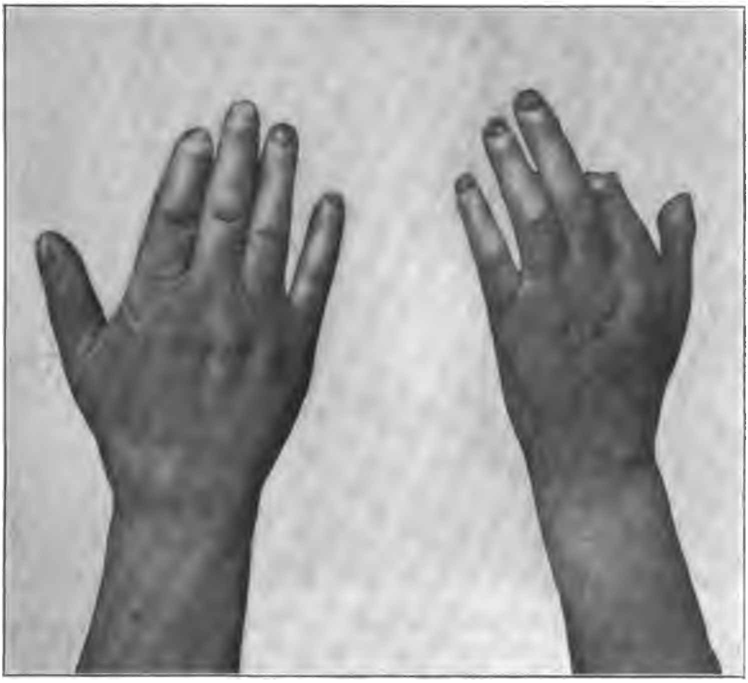
When I saw the patient for the first time I noticed great pallor of the third, fourth, and fifth left fingers, and of the little right finger.

The second, third, and fourth right fingers were moderately anæmic. (Fig. 1.) Sometimes the color changed into a cyanosed appearance.

Both hands were very cold, just as in true gangrene. No other parts of the body were affected. There was no fever. The examination of the urine was negative. The patient did not seem to be hysterical, but sometimes apparently suffered intense pain.

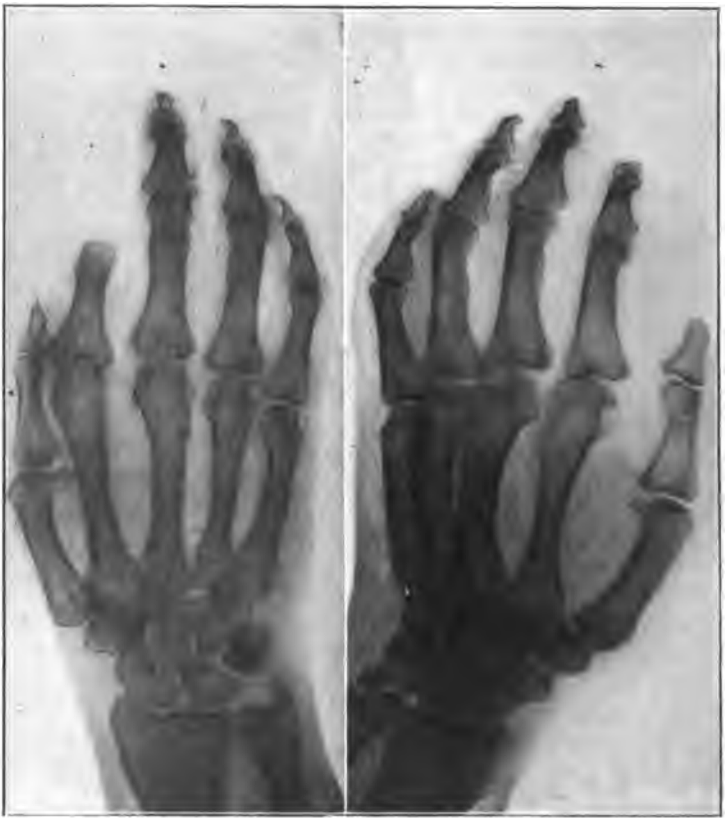
The skiagraph (Fig. 2) showed atrophy of the upper ends of the third phalanges (second phalanx of the thumbs) and osseous proliferation at the upper end of all second phalanges (first of the thumbs). There was also thickening of the epiphyseal ends of the second, third, and fourth metacarpal bones. The third phalanges appeared, in fact, triangular, and resembled claws.

FIG. 1.



CASE II.—A similar condition was found in a feeble man, aged thirty years, who at the present time has fully recovered. The onset took place on the toes of his right foot, gangrene of the whole foot becoming complete two months afterward, so that Syme's operation was performed. Skiagrams taken of the living foot before and after the operation showed nothing abnormal. But one year later the disease commenced in both hands to a moderate degree. The fingers were covered with cold sweat, and red and blue patches at times. The tip of the left index finger, together with the upper end of the third phalanx, became gangrenous. The skiagraph of the hand showed the same appearance as the case described above. The patient was treated with arsenic and local gentle massage.

FIG. 2.



The nutrition of the bone is much more disturbed by this unrecognized vasomotoric lesion than is assumed. It would be well worth while to study these phenomena more extensively.

OBSERVATIONS ON THE FREQUENCY AND DIAGNOSIS OF THE FLINT MURMUR IN AORTIC INSUFFICIENCY.[1]

By William Sydney Thayer, M.D.,
ASSOCIATE PROFESSOR OF MEDICINE IN THE JOHNS HOPKINS UNIVERSITY.

In 1862 Austin Flint, in an article on cardiac murmurs,[2] called attention to the occasional existence, in uncomplicated aortic insufficiency, of a presystolic murmur limited to the region of the cardiac apex, and distinct from the characteristic murmur of aortic regurgitation. This sound occurred in the latter part of diastole, was loud and blubbering, and had all the characteristics of a mitral, direct, presystolic murmur. Flint recognized it as such, and offered the following explanation: "The explanation involves a point connected with the physiological action of the auricular valves. Experiments show that when the ventricles are filled with a liquid, the valvular curtains are floated away from the ventricular sides, approximating to each other and tending to closure of the auricular orifice. In fact, as shown by Drs. Baumgarten and Hamerik, of Germany, a forcible injection of liquid into the left ventricle through the auricular opening will cause a complete closure of this opening by the coaptation of the mitral curtains, so that these authors contend that the natural closure of the auricular orifices is effected not by the contraction of the ventricles, but by the forcible current of blood propelled into the ventricles by the auricles. However this may be, that the mitral curtains are floated out and brought into apposition with each other by simply distending the ventricular cavity with liquid, is a fact sufficiently established and easily verified. Now, in cases of considerable aortic insufficiency the left ventricle is rapidly filled with blood flowing back from the aorta, as well as from the auricle before the auricular contraction takes place. The distention of the ventricle is such that the mitral curtains are brought into coaptation, and when the auricular contraction takes place the mitral direct current passing between the curtains throws them into vibration and gives rise to the characteristic blubbering murmur. The physical condition is, in effect, analogous to contraction of the mitral orifice from an adhesion of the curtains at their sides, the latter condition, as clinical observation abundantly proves, giving rise to a mitral direct murmur of similar character."

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[1] Read before the Association of American Physicians, 1901.

[2] The American Journal of the Medical Sciences, 1862, iv. s., xliv., 29.

In 1883 Dr. Keyt,[1] while disputing Flint's explanation of the origin of the murmur, suggesting that it might arise at the aorta in systole, proposed that it be called the murmur of Flint, a term which has since been used by many. In 1883 Flint[2] recorded another observation of the same nature, and in 1886 discussed the subject at length in an article in THE AMERICAN JOURNAL OF THE MEDICAL SCIENCES, 1886, xci., 35, and since that time the phenomenon has been recognized by numerous clinicians.

Most observers who have recognized the Flint murmur have agreed on considering its occurrence unusual. Guitéras, however, sixteen years ago,[3] expressed the belief "that obstructive functional mitral murmurs are of frequent occurrence in aortic regurgitation." He suggested that the obstruction offered by the partially closed mitral valves at the time of the entrance of the auricular blood might serve in the manner of a safety-valve and help to prevent overdistention of the ventricle. Guitéras[1] reported three characteristic cases and advanced a modification of Flint's theory as to the manner of origin of this murmur, asserting that in aortic regurgitation the mitral leaflets are not "floated upward," but are actively driven against the auricular blood by the force of the general arterial tension; that such force is, in all probability, often exerted against the anterior leaflet of the mitral valve by a regurgitant current which falls directly upon it.

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[1] Boston Medical and Surgical Journal, 1883, cix., 30.

[2] Lancet, London, 1883, i., 131.

[3] Medical News, Philadelphia, 1885, xlvii., 533.

Osler[2] also asserts that this murmur occurs in a considerable proportion of all cases.

In Gibson's recent work,[3] after a thorough discussion of Flint's description of this murmur and a review of the literature on the subject, there appear the following words: "Being thoroughly conversant with Flint's views since the appearance of his second paper, the points under discussion have been diligently sought for by us; so far, however, without result. Cases have frequently presented themselves, no doubt, in which, with absolute evidence of aortic disease, there has been a presystolic murmur, but in every one of these, without exception, post-mortem examination has revealed mitral obstruction as well as aortic lesions."

My attention was first called to the subject fourteen years ago by Guitéras' article, and two years later, while house physician at the Massachusetts General Hospital, I had the good fortune to observe a case in which my diagnosis of the Flint murmur was confirmed by necropsy. Since that time I have been impressed with the fact that the Flint murmur is a far commoner manifestation than might be inferred from the usual statements in literature. It has, therefore, seemed to me that it might be of considerable interest to analyze the clinical and pathological records of those cases of aortic insufficiency which have come to necropsy in Professor Osler's clinic at the Johns Hopkins Hospital.

A majority of these cases have been under my personal observation.

The purpose of this investigation is to reach some conclusion as to the frequency of this phenomenon and the grounds upon which a diagnosis may be made *intra vitam*.

Inquiry into the exact physical cause of the murmur will be beyond the limits of this communication.

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[1] Transactions of the Association of American Physicians, 1887, ii., 39; also, Boston Medical and Surgical Journal, 1887, cxvii.

[2] Practice of Medicine, New York, 1898, 8vo, 3d ed, p. 714.

[3] Diseases of the Heart and Aorta, Edinburgh, 1898, 8vo., p. 497.

Since May, 1889, 74 cases of aortic insufficiency have come to necropsy at the Johns Hopkins Hospital. In 45, or 60.8 per cent., of these cases there was heard, at some time during the observation of the patient, a rumbling, echoing murmur in diastole, limited to the region of the apex, and differing from the diastolic murmur of aortic insufficiency; in other words, a murmur exactly similar to that characteristic of stenosis of the mitral valve. This murmur, in the great majority of instances, was truly presystolic in time, ending sharply in the first sound, or in a systolic murmur. In some cases it was separated by a short interval from the first sound, occurring in the middle of diastole.

In 12, or 26.6 per cent. of these cases, there existed a stenosis of the mitral valve as well as aortic insufficiency.

In 33, or 73.3 per cent., the mitral orifice was of normal or increased circumference.

In all of the 12 cases in which there was an actual mitral stenosis the anatomical lesion was an endocarditis. In one instance there was also general arterio-sclerosis.

Of the remaining 33 cases without mitral stenosis, the endocardial changes were part of a general arterio-sclerotic process in 16; in 17 there was chronic or acute endocarditis. In 4 of these latter instances there was a general arterio-sclerosis as well.

Of the 33 cases of aortic insufficiency in which, without mitral stenosis, a rumbling, vibratory presystolic murmur limited to the region of the apex was observed, the condition of the mitral valve, beyond the dilatation of the orifice which is the rule in well-marked aortic insufficiency, was absolutely normal in 17 instances; in 16 greater or less change was present.

Of these 16 cases, in 4 instances the changes consisted simply in a slight thickening of the free edges of the curtains; in 8 the changes were those of chronic endocarditis without stenosis; in 3 there was subacute vegetative endocarditis, quite insufficient to have caused the presystolic murmur; in 1 there were rather large fresh vegetations upon the valve, which might have been sufficient to cause a murmur in diastole.

Of these 16 cases in which there were changes in the mitral valve other than stenotic, the lesions were part of a general arterio-sclerotic process in 4, or 25 per cent.; in 12, or 75 per cent., the changes were those of chronic or acute endocarditis. In one of these cases there was also a general arterio-sclerosis.

Of the 17 instances in which the mitral orifice was normal, in 12, or 70.5 per cent., the changes in the aortic valve were secondary to a general arterio-sclerosis and atheroma of the aorta; in 5 there was chronic valvular endocarditis. In 3 of these latter cases there was also a general arterio-sclerosis.

In 29, or 39.1 per cent., of the 74 cases of aortic insufficiency no presystolic murmur was heard. In four of these cases there was mitral stenosis. Of the remaining 25 cases, in 10, or 40 per cent., the mitral valves were essentially normal; in the other 15, or 60 per cent., more or less marked chronic or acute alterations in the valves or chordæ tendinæ were present.

In 16, or 64 per cent., of these 15 cases the process was apparently secondary to a general arterio-sclerosis; in 8, or 32 per cent., the condition was the result of chronic or acute endocarditis; in 1 the lesion of the aortic valves was apparently congenital.

On considering these figures one or two interesting facts become evident.

With Regard to the Frequency of Mitral Presystolic Murmur in Aortic Insufficiency Uncomplicated with Mitral Stenosis.

Out of 58 cases such a murmur was heard in 33, or 56.8 per cent.

One might insist that this percentage is too large in that I have included among these 33 instances 16 in which chronic or acute changes other than stenotic were present in the mitral valve. Might not these changes, after all, have played a certain part in the production of the presystolic murmur? While it may be, as held by Phear,[1] that marked shortening of the chordæ tendinæ alone may sometimes result in a presystolic murmur, yet this event is assuredly rare. And the following figures suggest that changes in the mitral valve other than stenotic have little effect on the production of a presystolic murmur.

Out of 27 cases of aortic insufficiency in which the mitral valve was anatomically absolutely normal, a presystolic murmur was heard in 17, or 62.8 per cent.

Out of 31 instances of aortic insufficiency in which the mitral valve showed greater or less change other than stenosis, a presystolic murmur was heard in 16 instances, or 51.6 per cent.

It would then appear to be clear that disease of the mitral valve other than stenosis plays no essential part in the production of a presystolic murmur.

The majority of our cases, then, of aortic insufficiency have showed, on careful examination, a Flint murmur—that is, a presystolic or late diastolic, rumbling or echoing murmur, heard in the region of the apex —a murmur clearly independent of organic mitral stenosis.

Is it Possible to Distinguish Intra Vitam Cases of Aortic Insufficiency with Flint Murmur from those Complicated with Mitral Stenosis?

It may be well to consider, first, the relative frequency of some of the more characteristic physical signs of mitral stenosis. The following are, perhaps, among the more important:

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[1] Lancet, 1895, vol. ii. p. 716

1. *The character of the pulse,* which, as a rule, is small, and, in condition of good compensation, of tolerably good tension, often irregular.

2. *The character of the cardiac impulse.* The sharp, tapping, systolic shock is, perhaps, one of the most constant and characteristic signs of mitral stenosis.

3. *The thrill,* presystolic or sometimes mid-diastolic in time, and limited closely to the apex region.

4. *The evidences of right-sided hypertrophy* and the *accentuated second pulmonary sound,* which, however, are not especially important in the present consideration.

5. *The presystolic murmur.* There are few more characteristic signs than the rumbling, rasping or softer, echoing, vibratory, crescendo, presystolic murmur, ending, as it usually does, sharply in a snapping first sound. Sometimes, when the heart's action is slow, there may be a momentary separation between the end of the rumbling murmur and the occurrence of the first sound.

6. *The snapping first sound.* The modification of the first sound is also a very characteristic element in mitral stenosis—the first sound which has the short, snapping, valvular character of a second sound. An element of this snapping sound is often present, even when a well-marked systolic murmur occurs.

In many instances when thrill and presystolic murmur are entirely absent a snapping valvular first sound, in connection with a small pulse, a dilated right heart, and an accentuated second, pulmonic sound, may be sufficient to justify a diagnosis of mitral stenosis.

An analysis of the physical signs in 22 cases of uncomplicated mitral stenosis which have come to necropsy at the Johns Hopkins Hospital reveals the following facts:

1. *Pulse.* In all but three of these cases (86.3 per cent.) the pulse was of small size. In 3 instances where the stenosis was of very slight extent the pulse was described as of fairly good size.

2. *Thrill.* A thrill was present in 12, or 54.5 per cent., of the cases.

3. *Systolic shock.* A tapping systolic shock was present in 15, or 68.1 per cent., of the cases.

4. *Snapping first sound.* A characteristic snapping, valvular first sound was audible in 15, or 68.1 per cent.

5. *Presystolic murmur.* A presystolic murmur, the most characteristic of the cardiac signs, was present in 17, or 77.2 per cent., of the cases.

The most important signs, then, of mitral stenosis in order of frequency, are the presystolic murmur, the tapping shock of the first sound, the short, valvular, snapping first sound, the presystolic thrill, in association with the small pulse, the accentuated second pulmonic sound, and the enlargement of the right side of the heart.

Are these signs modified in cases of mitral stenosis combined with aortic regurgitation?

Let us examine our records with regard to the character of the signs in cases of this nature.

Sixteen such cases came to necropsy.

In 3 of these 16 cases there were no symptoms whatever of mitral stenosis. One of these was a case of marked aortic stenosis with insufficiency and slight narrowing of the mitral orifice; in another case, seen only *in extremis*, but a slight presystolic thrill at the apex was noted.

1. *Pulse.* In 1 of these 16 instances, that combined with aortic stenosis, there was naturally a small pulse; in 4 the pulse was large and collapsing, but in 1 the statement is made that it was not of a typical Corrigan quality; in 3 it was noted that the pulse was of moderate size and collapsing; in 1 a collapsing character alone was mentioned; in 3 it was noted that the pulse was small, but collapsing; in 3 the pulse was small, but no especial mention of its aortic character was noted; in one it was especially noted that the pulse was not of aortic quality.

2. *Thrill.* Of these 16 cases, a presystolic thrill was present in 8, or 50 per cent.

3. *Systolic shock.* A tapping systolic shock was noted in 7, or 43.7 per cent.

4. *Snapping first sound.* A snapping first sound was heard in 12, or 75 per cent.

5. *Presystolic murmur.* A presystolic murmur was present in 12, or 75 per cent.

The most constant and characteristic symptoms here, as in uncomplicated mitral stenosis, are the presystolic murmur and the snapping character of the first sound.

In 10 of these cases, where the aortic lesion was the more important, the degree of hypertrophy of the left ventricle was marked. In five, however, where the mitral stenosis was of considerable extent, there was but a moderate enlargement of the left side in association with a rather small pulse. In 1, where the aortic lesion was apparently primary, there was marked hypertrophy, with a small collapsing pulse.

The following table may serve to emphasize the modifications of the more essential signs of mitral stenosis observed in cases complicated with aortic insufficiency:

TABLE I.

	Uncomplicated mitral stenosis.	Mitral stenosis and aortic insufficiency.
Small pulse	86.3 per cent.	37.5 per cent.
Thrill	54.5 "	50 "
Tapping systolic shock	68.1 "	43.7 "
Snapping first sound	68.1 "	75 "
Presystolic murmur	77.2 "	75 "

A consideration of these figures would appear to show that the ordinary signs of mitral stenosis, apart from the greater left-sided hypertrophy, are not essentially changed when this condition is complicated with aortic insufficiency, with the exception of the fact that the pulse in the latter condition is often of a larger size and collapsing and—a modification of some interest—that the tapping character of the systolic shock is considerably less frequent.

Let us now compare with these figures the results of our analysis of the symptoms in 33 cases of aortic insufficiency with Flint murmur.

1. *The pulse.* Of 33 cases of aortic insufficiency uncomplicated with mitral stenosis in which Flint murmur was heard, 1 was associated with aneurism of the aorta, 1 with a slight aortic stenosis, while in another the patient was moribund and the pulse was impalpable at the wrist. In 1 no satisfactory note could be found, and in another instance the only note was made toward the fatal termination of the case during a pericarditis.

Of the remaining 28 cases a typical Corrigan pulse was noted in 14, or 50 per cent. In 4 the pulse was of typically aortic character, with the exception of the fact that the size was hardly as large as is commonly noted. In 4 the pulse was collapsing, but no note was made of the size. In 1 the statement was made that the pulse was slightly collapsing in character. In 3 the pulse was said to be of a somewhat aortic character. In 2 it was simply noted that the pulse was compressible. In 1 the statement is made that the pulse was of fair volume and good tension.

In none of these instances, then, was the pulse described as small.

2. *Thrill.* Of 33 cases of aortic insufficiency with Flint murmur, a palpable thrill was observed in 14, or 42.4 per cent.

3. *Tapping systolic shock.* A characteristic tapping systolic shock was noted in but 5, or 15.1 per cent., of the cases, and in 2 of these instances the tapping character was slight or inconstant.

4. *Snapping first sound.* Of 33 cases of aortic insufficiency with Flint murmur the first sound was of a snapping valvular character in but 10, or 30.3 per cent. In 2 of these instances the snapping character was very slight, and in a third inconstant, having been noted only during attacks of tachycardia.

A better estimate of the differences in the physical signs from those in aortic insufficiency complicated with true stenosis may be made from a study of the following table, in which the symptoms in cases with Flint murmur are placed side by side with those in uncomplicated mitral stenosis and combined mitral stenosis and aortic insufficiency. For the sake of a fairer comparison only those cases of true mitral stenosis and mitral stenosis complicated with aortic insufficiency have been tabulated in which a presystolic murmur was present.

TABLE II.

	Uncomplicated mitral stenosis. (17 cases.)	Mitral stenosis and aortic insufficiency. (14 cases.)	Aortic insufficiency with Flint murmur. (33 cases.)
Small pulse . . .	82.3 per cent.	28.5 per cent.	.0 per cent.*
Presystolic thrill .	64.7 "	50 "	42.4 "
Tapping systolic shock	76.4 "	50 "	15.1 "
Snapping first sound .	64.7 "	78.5 "	30 3 "

* Based on 28 cases. See above.

These tables bring out certain fairly well-marked clinical differences between the cases of aortic insufficiency with Flint murmur and those complicated with true mitral stenosis. The character of the presystolic murmur is essentially the same in both conditions with one exception: a Flint murmur is never as rasping and intense as are the more marked murmurs of true mitral stenosis; it is commonly echoing and of moderate intensity. It is fair, however, to remember that in a very large proportion of cases of true mitral stenosis the murmur is also of this character. Out of the 22 fatal cases of mitral stenosis above referred to, the murmur was absent or was described as an echo or as a faint rumbling murmur in 12, or 54.5 per cent., of the cases.

The presystolic thrill is also less frequent and less intense, but perhaps the most striking difference between the two conditions is in the character of the systolic shock. In but a very small proportion of the cases of aortic insufficiency with Flint murmur does the apex impulse have the tapping character so significant of a true mitral stenosis; this appears, however, to be present in about half the cases of aortic insufficiency combined with true mitral stenosis. In the majority of instances of Flint murmur the systolic impulse has the usual characteristics of that observed in aortic insufficiency, namely, a forcible but rather heaving lift. The snapping valvular first sound is also rare. In the instances with Flint murmur the first sound, if it be not replaced by a systolic murmur, is commonly dull, humming, prolonged, indeed, as is often the case in aortic insufficiency, almost more a lift than a sound.

But, apart from the physical signs related to the heart itself, there are other points which may be of considerable help in diagnosis. Most important among these is the pulse. The pulse in aortic insufficiency complicated with true mitral stenosis was recorded as small in over a quarter of the cases. In uncomplicated aortic insufficiency with Flint murmur the pulse is always characteristically large and collapsing.

The condition of the peripheral arteries and various points in the history of the case may also be of assistance in diagnosis.

Thus, out of 16 cases of aortic insufficiency complicated with mitral stenosis in all but 3, or 81.2 per cent., there was a distinct history of rheumatism or chorea, or symptoms justifying a diagnosis of acute endocarditis. In 3 cases the process was clinically arterio-sclerotic.

Out of 33 cases of aortic insufficiency with Flint murmur there was a clinical history of acute rheumatism, or chorea, or signs justifying a diagnosis of endocarditis *intra vitam* in but 13 instances, or 39.3 per cent., while in 18, or 54.5 per cent., there was clinical evidence of a general arterio-sclerosis.

Anatomically the changes in the valves were part of a general arterio-sclerosis or an atheroma of the aorta in 20, or 60.6 per cent., of the cases. In 13, or 39.3 per cent., of the cases the condition was an acute or chronic endocarditis. In 4 of these cases there existed also arterio-sclerosis.

In 25 cases of uncomplicated aortic insufficiency without Flint murmur the percentages were essentially the same. In 16, or 64 per cent., the process was a part of a general arterio-sclerosis; in 8, or 32 per cent., the condition was due to endocarditis; in 1 the defect in the valve was congenital.

As might be expected, there are certain slight differences in the average age of the cases with Flint murmur and those of aortic insufficiency complicated with mitral stenosis—differences depending clearly upon the fact that in the one condition the changes are more commonly due to arterio-sclerosis, which is generally a senile change, and in the other to endocarditis, which so frequently occurs in early life. This is well shown by the following table:

TABLE III.

Age.	Aortic insufficiency with Flint murmur.	Aortic insufficiency complicated with mitral stenosis.
1-10	1	0
10-20	5	3
20-30	4	3
30-40	9	5
40-50	7	2
50-60	5	2
60-70	1	0
70-80	1	1
Totals	33	16

Thus, it will be seen that 57.5 per cent. of the cases of Flint murmur occurred in individuals under forty years of age, against 68.7 per cent. among the cases of true mitral stenosis. But these differences are too slight to be of any diagnostic importance.

That there is nothing essential in the arterio-sclerotic process which predisposes to the development of a Flint murmur is shown by the fact that out of 32 cases of uncomplicated aortic insufficiency where the lesion was purely arterio-sclerotic in origin, a Flint murmur was heard in 50 per cent., while in 21 instances where the lesions were due to an acute or chronic endocarditis the percentage of Flint murmurs was actually greater, namely, 60.9 per cent.

The diagnostic importance of demonstrable arterio-sclerosis lies in the fact that while arterio-sclerotic cardiac lesions are usually confined to the aortic orifice, in endocarditis, on the other hand, the possibility of simultaneous affection of the mitral valves, and hence the probability of a true stenosis, is appreciably greater.

Broadbent[1] believes the Flint murmur to be more frequent in cases where the insufficiency is combined with stenosis of the aortic valves.

In three of our cases there was aortic stenosis as well as insufficiency, but in only one was a Flint murmur heard. In the other two instances, despite the existence of true mitral stenosis in one, there was no presystolic murmur.

To sum up the results of these comparative observations it may be said that a positive diagnosis of a functional mitral presystolic murmur may be difficult to make. The character of the murmur differs in no way from that of true mitral stenosis. In true mitral stenosis, however, even if complicated with aortic insufficiency, the tapping systolic shock and the snapping first sound are common. The Flint murmur, on the other hand, is usually associated with the characteristic, heaving impulse of aortic insufficiency and the dull, ill-defined, prolonged first sound. A tapping impulse and a snapping first sound may, however, be present.

Of special importance is the character of the pulse. In cases of aortic insufficiency with Flint murmur the pulse is large and collapsing; in instances combined with true mitral stenosis there is generally an appreciable modification of the size of the pulse.

The diagnosis of Flint murmur is fairly safe when a rumbling or echoing presystolic murmur in the region of the apex is present in aortic insufficiency occurring in an individual with well-marked general arterio-sclerosis, especially where there is no history of any acute malady ordinarily associated with the development of endocarditis, and in the absence of a marked systolic shock or snapping first sound. If, on the other hand, the patient be an individual with soft peripheral arteries and a history of attacks of acute rheumatism or chorea, or other evidence suggestive of the existence of an endocarditis, the probability of concomitant affection of the mitral valve is greater, and the possibility of arriving at a definite diagnosis is correspondingly less.

While, as a rule, the Flint murmur is not of very great intensity, is associated with little or no thrill, with no marked tapping systolic shock, and rarely with a snapping first sound, there may be striking exceptions to this rule. The following case may serve to show how careful one should be in assuming the existence of a true mitral stenosis from the presence of nearly all the classical signs, if aortic insufficiency be present.

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[1] Heart Disease, London, 1900, 8vo., 3d ed., p. 150.

D. B., a colored laborer, aged between forty-five and fifty-five years, was admitted to the Johns Hopkins Hospital on July 22, 1896, complaining of shortness of breath and swelling of the legs. His family history was negative, as was his personal history, except for what was, apparently, an attack of sciatica which lasted for about four months.

For several months before entry he had been suffering with shortness of breath, which had steadily increased. For four weeks there had been swelling of the abdomen. Two months before entry he had to give up work on account of shortness of breath.

Physical Examination. The patient was a fairly well-nourished colored man with well-marked arcus senilis. The radial arteries were moderately thickened. There was œdema of the legs, and ascites. Examination of the lungs showed fine moist râles at both bases.

Heart. The cardiac impulse was in the fifth interspace about in the mammillary line. There was no marked systolic shock, but a slight presystolic thrill was to be felt. On auscultation at the apex there was heard a slight presystolic murmur ending in a snapping first sound, followed by a soft systolic murmur; the second sound was not audible at the apex. Passing upward toward the base a well-marked diastolic murmur of aortic character became audible; it was of maximum intensity at the left third and fourth cartilages. The pulse was collapsing.

Under rest, diuretics, and iodide of potassium the patient improved greatly, and left the hospital on August 31st.

From this time up to the date of his death the patient was admitted to the hospital five times.

On September 21, 1896, the following note was made by Professor Osler: "At the apex-beat a loud systolic shock is preceded by a somewhat rough murmur in diastole, which does not run quite up to the beat."

And, again, on September 25, 1896: "At the sixth interspace a rough presystolic murmur is well heard, and the shock of the first well felt; no thrill. The systolic shock is marked."

On October 2d: "The shock of the first sound is well marked on palpation."

On April 2, 1897, the following note was made by Dr. Thayer: "The pulse is collapsing and rather large, but not as large as often seen in aortic insufficiency. At the point of maximum impulse there is no distinct thrill. The first sound is rather sharp and followed by a slight systolic murmur which is lost in the mid-axilla. As one passes outside the point of maximum impulse the snapping character of the first sound is rather suggestive. The second sound at the point of maximum impulse is followed by a slight, soft, diastolic murmur. Almost immediately after the second sound there begins another murmur, which at first is extremely difficult to separate from the aortic diastolic, but which is of a different pitch. This is heard best in the fifth space just in the mammillary line, where it has an echoing quality and increases in intensity, ending in the first sound. It is not heard above the fifth rib or inside the parasternal line, and is lost a short distance outside the point of maximum impulse. Above and inside of this area a soft systolic and diastolic murmur are to be heard. The diastolic murmur is audible in the aortic area, but is loudest along the left border of the sternum at about the fourth space; it has a soft, aortic character. In the aortic area it does not entirely replace the second sound. The second pulmonic is not particularly loud; systolic and diastolic tones in the carotids."

April 9, 1897. Dr. Osler: "Systolic shock is well felt at the apex and base. . . . The presystolic murmur has all the characters of a true stenotic murmur."

The patient died on October 30, 1898. Repeated notes were made by Professor Osler, by Drs. M'Crae and Futcher, and by myself. The valvular snapping character of the first sound was constantly referred to. The thrill was of moderate intensity and was often absent. The presystolic murmur also varied greatly in intensity.

Owing to the nature of the systolic shock and the snapping character of the first sound, a diagnosis of true mitral stenosis in association with aortic insufficiency was universally concurred in.

The necropsy, however, showed general arterio-sclerosis with moderate thickening and retraction of the aortic valves. The mitral curtains were absolutely normal.

A word before closing as to the cause of this interesting phenomenon. As I stated in the beginning, Flint[1] assumed that the back flow of blood from the aorta resulted in a floating upward of the valvular curtains so that they were brought approximately into apposition, thus causing a practical stenosis of the mitral valve at the time of contraction of the auricle.

Keyt's[2] view that the murmur arises at the aortic orifice in systole is scarcely worth considering.

Guitéras,[3] as has been said, adopted a modification of Flint's view. "He forgets, it seems to me," he says, "that in aortic regurgitation the leaflets are not floated upward, but are actively driven against the auricular blood by the force of the general arterial tension. . . . I maintain that these propagated murmurs are, in fact, mitral obstructive murmurs, and that they are more apt to develop when the posterior aortic segment is affected, because in such cases the recurrent stream is brought to bear directly against the anterior leaflet of the mitral valve."

Sansom[4] asserts that the development of a presystolic murmur would be impossible if, as Flint suggested, the mitral curtains were actually brought into coaptation. "I cannot imagine that, the mitral curtains being brought into coaptation, and the orifice being itself closed, any force proceeding from the auricle could separate them or cause the blubbering sound. It would be quite otherwise, however, if they were brought together without completely closing the auriculo-ventricular aperture. In such a case two explanations will be possible: (*a*) The lifting force of the current impinging upon the under surface of the great anterior mitral curtains might so obstruct the current from the

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[1] Op. cit. [2] Op. cit. [3] Op. cit.

[4] The Diagnosis of Diseases of the Heart and Thoracic Aorta, London, 1892, p. 335.

auricle as to create a *de facto* impediment at the end of each diastole; or (*b*) the vibrations might be directly communicated by the regurgitant stream from the aorta to the great mitral curtain. The nearness of the posterior segment of the aortic valve—diseased, perhaps, so that the morbidly-produced orifice in diastole presents ragged or fringed borders—to this mitral flap may well account for such vibrations. These vibrations may attain only to an intensity and rapidity sufficient to cause murmur somewhat late in the diastolic period. The force of the auricular systole would necessarily amplify and intensify such vibrations of the free edge of the flap until the commencement of ventricular systole or the tug of the chordæ tendinæ abruptly stopped them, bringing both curtains of the valve together and completely closing the auriculo-ventricular orifice. It occurs to me that this is a more probable explanation than that which postulates the production of a virtual stenosis of the orifice by the fluid pressure of the aortic regurgitant stream."

Potain[1] is inclined to accept the idea that "the retrograde blood current from the aortic orifice, which is insufficient, presses back the great curtain of the mitral, whence a relative narrowing of the mitral orifice. This great curtain is then between two parallel currents of varying rapidity, the retrograde current of aortic insufficiency and that produced by the blood coming from the auricle. Under the influence of these two currents the mitral valve enters into vibration which results in the production of a thrill appreciable by the hand and of the presystolic murmur or rumble perceptible to the ear."

Essentially the same view is held by Broadbent.[2]

This explanation of the origin of the murmur is similar to that of Guitéras, and would seem, upon the whole, reasonable.

In conclusion, one may be justified in saying that in uncomplicated aortic insufficiency a rumbling, echoing, presystolic, or mid-diastolic murmur limited to the region of the apex of the heart is very common, occurring, when carefully looked for, in fully half of the cases. The characters of this murmur are in no way different from that commonly observed in true mitral stenosis, with the exception of the fact that it is usually of moderate intensity. It is, however, rarely associated with a tapping systolic impulse and a snapping first sound, which are the rule in true mitral obstruction, while the pulse is large and characteristic of uncomplicated aortic insufficiency. In the absence of these signs, and with a large pulse the functional character of an apex presystolic murmur in aortic insufficiency is to be suspected, especially in cases where there is no history of acute infectious processes such as are ordinarily associated with endocarditis, and where there is evidence of well-marked arterio-sclerosis.

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[1] Gaz. d. Hôp., Paris, 1893, lxvi., 295.

[2] Op. cit.

A Flint murmur may, however, be associated with many of the clinical features of a true organic mitral obstruction.

OSTEITIS DEFORMANS.[1]

BY FREDERICK A. PACKARD, M.D., J. DUTTON STEELE, M.D.,
AND
THOMAS S. KIRKBRIDE, JR., M.D.,
OF PHILADELPHIA.

BEFORE proceeding with the report of this case we would state that the histological examination of the tissues was begun by the late Dr. T. S. Kirkbride, Jr., whose untimely death from typhoid fever, contracted in laboratory work, came soon after the beginning of what promised to be a brilliant career. The work so begun by Dr. Kirkbride was taken up and carried to completion by Dr. Steele.

In April, 1899, there was admitted to the men's ward of the Philadelphia Hospital a German, aged sixty-two years, who for some months had been an inmate of the almshouse department. Until the onset of an acute indisposition, for which he was referred to the wards, he had attracted no particular attention. Owing to the fact that he could speak almost no English and was very deaf, with some impairment of mental power, nothing could be learned of his past history. Attention was attracted to him by the size of his head, which was that of a man very much larger than he was. Not only was his head large, but it had a peculiar shape, being rather box-shaped, with a marked projection of the forehead, flattened crown, and a distinct tumor at the junction of the left temporal, frontal, and parietal regions. (See Figs. 1, 2, and 3.) The face was somewhat larger than that of a normal individual of the same size, but was small in proportion to the size of the calvarium. The mastoid processes were large and heavy, and the lower jaw was also disproportionately large, but was not prognathous. The soft parts of the face showed nothing out of the way. Measurements of the head were taken shortly after his admission, and again about a year later. For the purpose of comparison both sets of measurements are inserted here:

	Shortly after admission.	February 12, 1900.
Bitemporal	14 cm.	15½ cm.
Binaural	15 "	14½ "
Fronto-occipital	20 "	20¾ "
Occipitomental	20 "	23 "
Biparietal	17 "	19½ "
Angular	13 "	13 "
Greatest circumference . .	63 "	63 "
Circumference of vault from meatus to meatus . . .	40½ "	41 "

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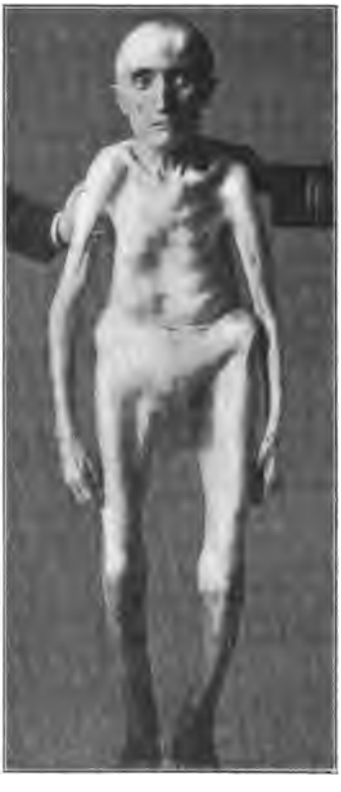
[1] Read before the Association of American Physicians, 1901.

The head and face, therefore, were rather egg-shaped, with the larger end of the oval pointing upward, as is well shown in the figures. The tongue was of normal size, the vault of the hard palate capacious, but not deep; the alveolar processes were excessively thick. All of the sutures and fontanelles were closed, and showed no depression or ridging. The speech was very peculiar, and practically unintelligible, although not entirely because of ignorance of the language, as an occasional English word could be discerned so thickly emitted that its recognition was almost impossible. The larynx was very large and broad, giving the neck a rather full appearance, but the thyroid gland could not be outlined.

A curious alteration of the shoulder girdle was present, due to the fact that, while the clavicles stood out prominently because of thickening of the bones and increase in their natural curves, their direction was almost backward. The upper ends of both humeri, especially the heads, were much thickened, and the natural curves and elevations were very much exaggerated. On both sides there was marked anterior curvature at the level of the deltoid insertion. The elbow-joints appeared to be normal, as were also the bones of the left forearm. In the right forearm there was marked curvature of both bones toward the radial side. On both sides the radius and ulna had a distinctly rough and uneven surface. The appearance of the chest can best be appreciated by a glance at Fig. 2. Above, the chest was small and narrow with the antero-posterior diameter almost equal to the lateral, while below the chest was large and bulging. No substernal dulness could be detected. The xiphoid process was very prominent and broad, and the ribs were distinctly thick and heavy. On each side the tip of the eleventh rib was almost in contact with the crest of the ilium. The costo-sternal angle was very obtuse. There was marked forward curvature of the spine, with very evident thickening of the lower dorsal and upper lumbar vertebræ. Dorsocervical kyphosis was present without scoliosis. The scapulæ were apparently not enlarged.

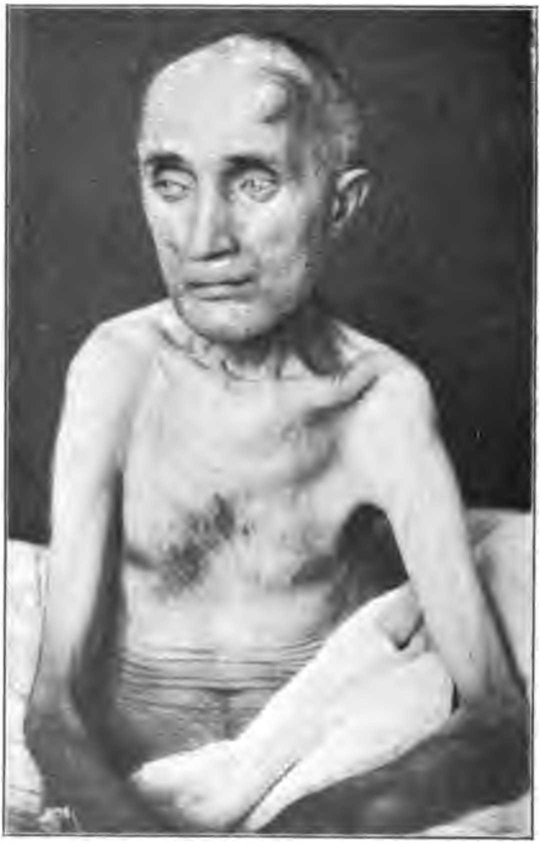
FIG. 1.



Photograph of subject of report, showing shape of head, frontal tumor, and bony deformities.

Examination of the abdomen showed that there was excessive pigmentation of the skin and growth of hair on the anterior surface. Just beneath the costal margin there was a deep transverse furrow extending across the abdomen. The general outline of the abdomen was that of a diamond, the angles of which were formed by the xiphoid angle, the pubis and the junction of the ribs with the crests of the ilium. The pelvis resembled in shape that of the female rather than that of the male, being very broad and heavy, and the superior basin being very capacious. The distance between the anterior superior spines was 31 cm. The iliac crests were remarkably heavy, and projected far beyond the level of the trochanters. The extreme lateral width of the pelvis was 34 cm., the intertrochanteric distance being 30 cm., while the patient's total length was only 57 cm. The thigh bones were somewhat large, but were not much deformed, except for the condyles, which were very large. The patellæ were about normal in size. In the skin over the left patellar tendon there was a flat, circular mass of about 2.5 cm. in diameter, apparently situated in the superficial layers of the skin, and giving to the finger the sensation of an enchondroma. Both

FIG. 2.



Photograph of subject of report, showing size of head, frontal tumor, clavicle, and peculiar shape of chest.

tibiæ were greatly increased in thickness, especially on the anterior aspect, the surface of which was rough. This thickening and prominence were more marked on the left side than on the right. The fibula of the left side was decidedly thickened. Both legs showed marked outward bowing, the distance between the knees when the feet were placed together being 7.5 cm. The hands and feet were not enlarged.

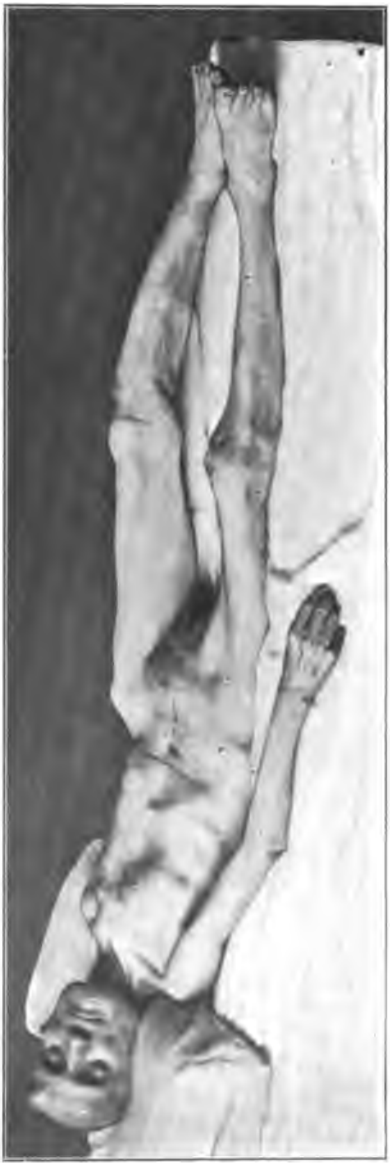


FIG. 3.

Showing especially the separation of the knees when the ankles were in contact.

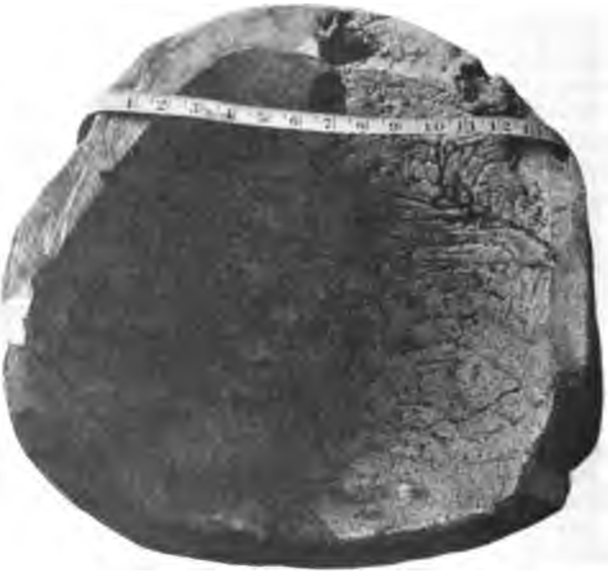
In no part of the body was there evidence of involvement of the soft parts. The whole attitude of the patient on standing up irresistibly reminded one of that of the orang-outang.

On his admission the man had a large pleural effusion in the right side. This was withdrawn, and did not reaccumulate. He, however, remained feeble with progressively increasing emaciation and slow growth of the tumor in the frontal bone until his death, about a year after coming under observation.

Autopsy was held twenty-four hours after death. The following notes were made at the time: Rigor mortis is well marked. External conformation as described in clinical notes. On removing the scalp there is found a large subcutaneous tumor springing from the frontal bone to the left of the median line. The tumor is of soft consistence. In places the scalp is remarkably thin, especially in the left temporal region. The outer surface of the calvarium has a rather bluish appearance, and seems somewhat more vascular than normal. The saw cuts very easily through the bones of the skull. The tumor mentioned above is found to measure 4 x 5 cm. at its base, and has an elevation of 2 cm. The calvarium is fairly uniformly increased in thickness, measuring from

1½ to 2 cm. (See Fig. 4.) The diploë is apparently absent, excepting in the frontal and occipital regions. A little to the left of the median line, at a point corresponding to the superficial tumor, the bone is thickened to 3 cm., owing to the presence in the diploë of a soft growth corresponding in consistence to that seen externally. The growth projects through both the inner and outer tables. The brain is adherent to and almost incorporated with the growth. The whole hollow of the frontal bone on the left side is occupied by a large irregularly rounded mass, of soft consistence, and measuring 5 cm. in all directions. The base of the skull appears large and gross, and all of its concavities are deepened except the sella turcica, which is of about normal size. The inner table of the calvarium is deeply grooved for bloodvessels and freely perforated by small foramina. The base of the brain shows great overfulness of the bloodvessels. The membranes of the brain seem unaltered over a greater part of the surface, but over the convexity the pia is slightly opaque. In the left frontal region anteriorly to the operculum the brain substance is torn and softened at a point corresponding to the tumor of the calvarium. On the posterior end of the third frontal convolution there are some small whitish granules (sarcoma or tuberculosis ?). Similar masses are found bordering upon the longitudinal sinus of the left side.

FIG. 4.



Calvarium.

On the right side there are some old adhesions of the pleura, especially near the apex ; the left pleura contains a small amount of fluid. The layers of the pleura on the left side are much thickened, and there is on them a gelatinous substance which partially fills the cavity. A large " milk patch " is present on the anterior wall of the left ventricle. The heart muscle is soft and flabby, but there is no other alteration of the walls or valves. There is an area of atheroma at the root of the aorta. The left lung is almost but not quite airless. The diaphragm on the left side shows irregular thickenings of yellow color looking like sarcoma. The right lung shows only hypostatic congestion. The spleen is large, measuring 13 x 8 x 3.5 cm. The pulp is very soft and the Malpighian bodies prominent. The left suprarenal capsule is thin, and the distinction between the cortex and the medulla is very poorly marked. The kidneys are large and pale, with somewhat prominent vessels, and capsules stripping off readily. The right suprarenal resembles the left except for the fact that there is a post-mortem cavity in the medulla. The liver shows slight distention of the small bile passages; the substance of the organ appears fairly normal. The bile ducts are patulous, and the mucous membrane of the gall-bladder has a normal appearance. The pancreas is rather small, but seems otherwise normal.

Owing to the limited time allowed for the autopsy, it was impossible to remove the spinal cord or the peripheral nerves. It is much to be regretted that preservation of the thyroid gland was for some reason inadvertently omitted. Grossly it showed no change, but it would have been advantageous to have proved its condition by microscopical examination. While changes in the spinal cord described by some observers are probably, as they have pointed out, due to the accompanying arterio-sclerosis, our inability to remove the spinal cord because of lack of time is a source of regret.

Microscopical Examination.—Clavicle. A portion of the bone was taken from about the middle of the shaft of the thickened portion. It was cut with the saw with somewhat greater ease than a normal bone. Decalcification in 5 per cent. nitric acid and phloroglucin was complete in twelve hours, showing the small amount of lime salts in the tissue, as ordinary bone requires from three to four days for decalcification in this solution.

The sections were stained by hæmatoxylin and eosin. The part of the shaft that is usually compact bone substance, with regular Haversian systems, consists of a finely porous structure in which areas of unaffected bone alternate with spaces that are evidently the result of its absorption. These spaces are filled with a fibrous-tissue reticulum. The cells of the spaces are mostly spindle in character; but there are also many round cells, with deeply staining nuclei, polymorphonuclear leucocytes, and a few nucleated red cells, and some fat cells. Most of the interspaces are exceedingly vascular. In many there are networks of dilated capillaries whose walls are but a single layer of endothelium. Larger arteries cannot be seen in the sections obtained. (See Fig. 5.)

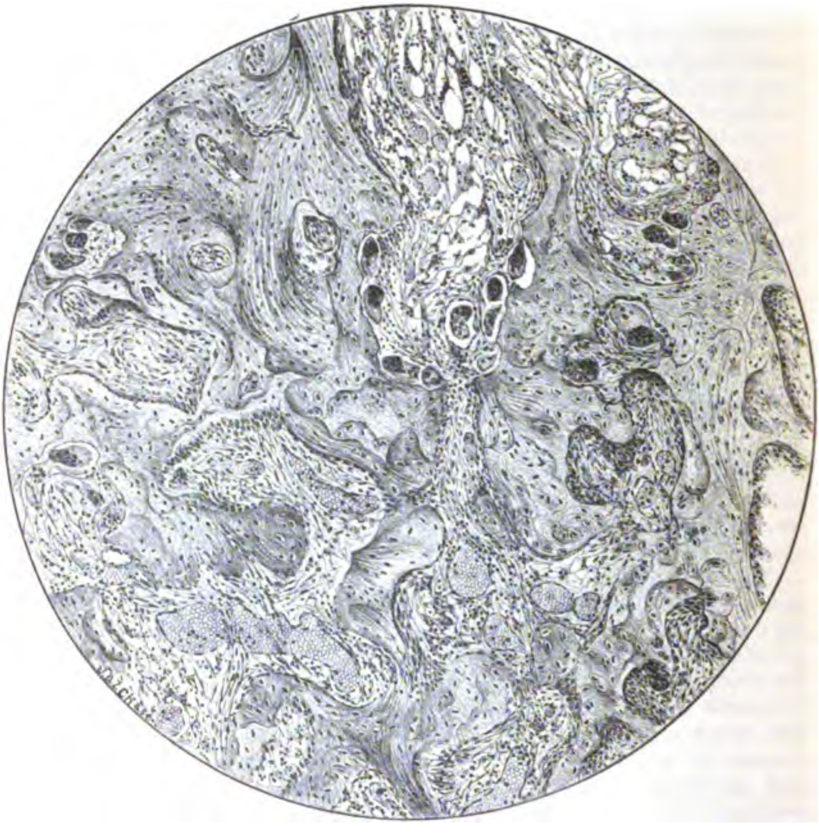
The reticulated structure runs almost to the periosteum, and a thin shell immediately under it is the only representative of the compact substance.

In the interspaces are numerous groups of giant cells with many nuclei. These cells lie in the edges of the unaffected bone, and are apparently engaged in its absorption.

Running through these interspaces and through the bone itself are masses of closely packed cells, resembling osteoblasts, with a fibrous matrix. This is evidently an attempt at the formation of new bone, but in no place is it calcified. The dividing line between the unabsorbed and new bone is sharp, and there is every indication that the processes are distinct from one another.

Skull. The distinction between the diploë and outer and inner tables is entirely lost, as far as could be seen from the sections of the bone obtained. There is a thin and irregular plate of compact bone under the periosteum, but elsewhere the bone is honeycombed by absorption spaces, giving it a porous structure. These interspaces (as in the clavicle) are filled by a connective-tissue reticulum containing spindle cells, round cells with large nuclei, polynuclear leucocytes, and a few giant cells. This last variety are not as numerous as in the sections from the clavicle. As in the clavicle, there are bundles of osteoblasts in a fibrous matrix running through the bone and spaces in all directions, evidently representing new bone. The interspaces in the skull are not as vascular as in the clavicle; however, they are well supplied with blood by capillaries. No large arteries are seen in the section. Sec-

FIG. 5.



Section of the shaft of the diseased clavicle. Leitz ocular 3, objective 3. The general asymmetry, absorption spaces and the fibrous, medullary substance, containing giant cells and many bloodvessels, are well shown. There are several areas of uncalcified new bone.

tions from the tumor of the frontal bone show it to be a typical giant-celled sarcoma. The mass of the tissue consists of bundles of spindle cells and masses of round cells, but there are also many larger cells with a single, irregularly staining nucleus, and numerous giant cells with five or more nuclei. In general, the sections examined show the following changes:

1. Absorption of the healthy bone.
2. Formation of new bone coincident, but in no way connected, with the absorption process.
3. The failure of calcification in this new bone.
4. The destruction of the regular structure of the bone and the addition of new uncalcified bony tissue.
5. The formation of a giant-celled sarcoma in the affected portion of the skull.

These changes correspond closely to those described by Paget, Stilling, and others who have subjected their cases of osteitis deformans to a microscopic examination.

Suprarenal Bodies. Microscopic examination shows these structures to be normal.

Hypophysis Cerebri. Sections of the hypophysis cerebri show no abnormality.

Nodule from the Pia. Consists of a collection of round and spindle cells with a moderate amount of intercellular substance and with deeply staining nuclei. It is well supplied by bloodvessels whose walls consist merely of a single layer of endothelium. In many places giant cells are found. The nodule is evidently a metastasis from the tumor of the frontal lobe.

The nodule from the diaphragmatic pleura is of the same structure as the nodule in the pia, and has evidently the same origin. It also shows numerous giant cells.

In the literature we find references to ninety-nine cases reported as osteitis deformans.[1] Careful study of these cases shows, however, that four of them were certainly instances of some condition other than even slightly developed osteitis deformans. Twenty-nine may possibly have been instances of this disease, but the facts given were not sufficiently definite to warrant the statement that they were typical cases of osteitis deformans. Many of these reported as instances of this disease were apparently examples of tumors of bone of more ordinary nature, or of osteomalacia or fragilitas ossium, with local enlargement secondary to fractures. Sixty-six cases were found which, in our judgment, are typical instances of the disease described by Paget, in 1877, in an article in the *Medico-Chirurgical Transactions.*

ETIOLOGY. Among the cases so far reported, 41 (including our own) were males, 24 females, and in 2 the sex is not stated. The youngest patient at the time of coming under observation was that of Watson, whose age was thirty-nine years, while 2 patients (Silcock's and Lloyd's) were eighty-two years old when they were first seen. Moizard and Bourges have, however, reported a patient who was seventy-three years of age when coming under observation, but the disease seems to have quite definitely started at the age of twenty-one. The average age at the time of coming under observation was sixty-one years; the age at the time of onset was capable of determination in 51 cases, and averaged forty-nine and one-half years, the youngest of these being the patient just mentioned, the oldest patient at the time of onset being between seventy-nine and eighty years of age. As will be seen, there is a marked difference between the time of coming under observation and the time when the first symptoms of the disease were noted; 11 of the 51 cases noted had symptoms definitely pointing to the onset of their disease when they were forty years old or younger. It can, therefore, hardly be said to be exclusively a disease of those very advanced in years.

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[1] Since the presentation of this paper a case has been reported by Atkinson (Maryland Medical Journal, July, 1901). The patient was a male, aged thirty-seven years. The bones affected were the skull, left forearm, and both femora, with considerable deformity. There was no autopsy. The case is apparently one of true osteitis deformans.

The mental capacity of our patient was but slight. In 1 case from the literature (Joncheray's) the patient and one other member of the family suffered from insanity, while a patient of Lunn's was insane. Inheritance seems to play but a small part in the etiology of the disease, although among the cases which we have studied we found two brothers with the disease reported by Lunn, while Pic and Robinson have each reported a case where the disease was present in two members of the same family.

The etiology of osteitis deformans is, therefore, very uncertain. It is undoubtedly a disease of advanced life, although, as we have mentioned, in eleven of the cases collected the disease began before the age of forty, while in the case of Moizard and Bourges the disease began at as early an age as twenty-one years. The influence of heredity is doubtful. In reviewing the literature there seems no striking evidence of any marked influence exerted by consanguineous marriages, nor does there seem to be any marked neurotic tendency in the families of those suffering from this disease. While a large proportion of the cases are found in English journals, too much importance should not be attached to locality as an etiological factor, as the disease was first described by Paget, and we would expect his countrymen to be more familiar with the disease described by him than those whose attention had not been particularly drawn to the subject. In this connection it is interesting to note how frequently a series of cases are reported in rapid succession in various countries, showing that the mere fact of the public mention of the disease would seem to excite interest in the condition sufficient to cause recognition of other cases.

SYMPTOMATOLOGY. The analysis of the cases reported shows that in 14 enlargement of the head was first noted; that in 13 deformity of both tibiæ was mentioned as the first sign of the disease; in 11 the left and in 6 the right tibia was first involved; while deformity of the spine was first seen in 2; of the right radius in 2; of the right clavicle, lower jaw, and sternum each in 1 case.

Analysis of the cases in regard to the bones affected at the time of coming under observation was not possible in all of the cases. In those where sufficient details were given it was found that deformity was distributed as follows: In 49 of the cases the bones of the skull were involved. (It should be noted that among the 66 cases from the literature 9 departed from the type described by Paget, in the fact that there was no manifest enlargement of the head, 1 of these cases having been seen by Paget and considered by him a true instance of the disease.) Both tibiæ were affected in 47, the right tibia alone in 2 cases, the left tibia alone in 1 case. In 40 cases both femurs were affected, while the right femur was alone involved in 3, the left femur in 1 case. The spine was affected in 31 cases when they came under observation. In 24 cases both clavicles were thickened and deformed, the right clavicle being affected alone in 3 cases, the left in 4 cases. The bones of the pelvis were affected in 21 cases. In marked contrast to the frequency of involvement of the tibiæ, the fibulæ were found to be affected in only 10 cases. The humeri were symmetrically involved in 14 cases, while

FIG. 6.

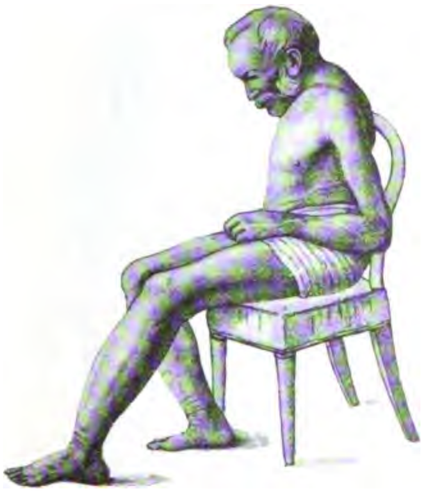

FIG. 7.

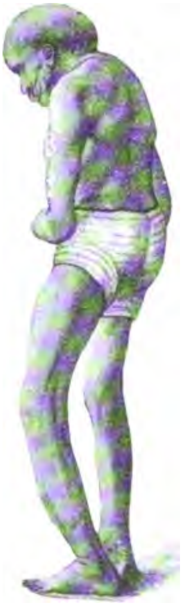

Fig. 6.—From Paget's original paper. (Medico-Chirurgical Transactions, 1877.)
Fig. 7.—From Paget's original paper. Ibid.

in 3 cases that of the right side and in 4 that of the left side were involved. Both radii were affected in 11 cases, while in 5 the right alone and in 3 the left radius alone were affected. In 10 cases the ulnæ were involved, the left ulna being deformed in 2, while the right ulna was noted in no case as being affected where the left escaped. The scapulæ were involved in 6 cases. The ribs were thickened in 16, while the sternum was involved in 7. In 8 cases it is mentioned that the lower maxilla was apparently affected by the disease, while in 1 case it is stated that the bones of the face were involved. In only 8 instances were the patellæ affected. The metatarsal bones were involved in 5, the tarsal bones in 2 cases, and the calcaneus in 1 case. It is seen, therefore, that after the skull the tibiæ are the bones most frequently affected, these being followed by the femurs, spine, pelvis, and clavicles, ribs, radii, and ulnæ. This distribution would seem to rather point

FIG. 8.

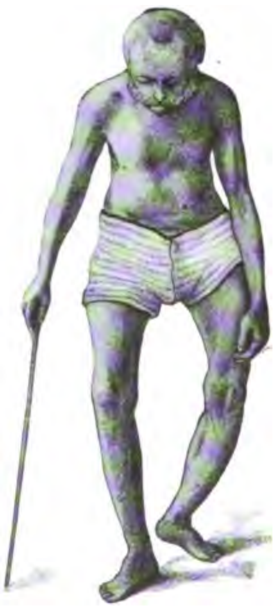

FIG. 9.

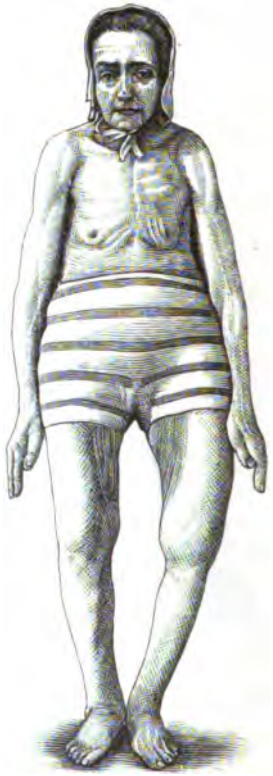

Fig. 8.—From Paget's original paper. (Medico-Chirurgical Transactions, 1877.)
Fig. 9.—Marie's case. (Nouvelle Iconographie de la Salpêtrière, 1894.)

toward the fact that pressure and gravity had at least a large share in the production of the deformities.

While in many of the cases there has been complaint of pain in the bones subsequently affected, our study of the literature would not cause us to attach much importance to this as a symptom of the disease, nor, in fact, has the latter much symptomatology, the results being almost entirely objective.

FIG. 10.

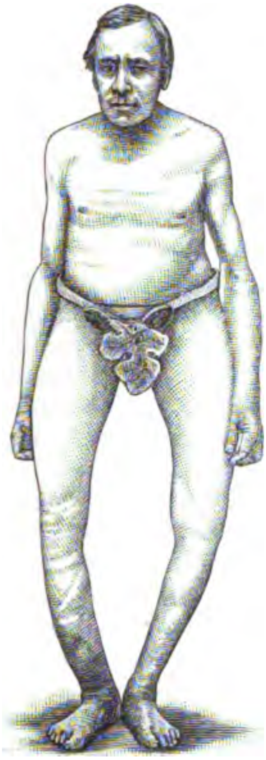

FIG. 11.

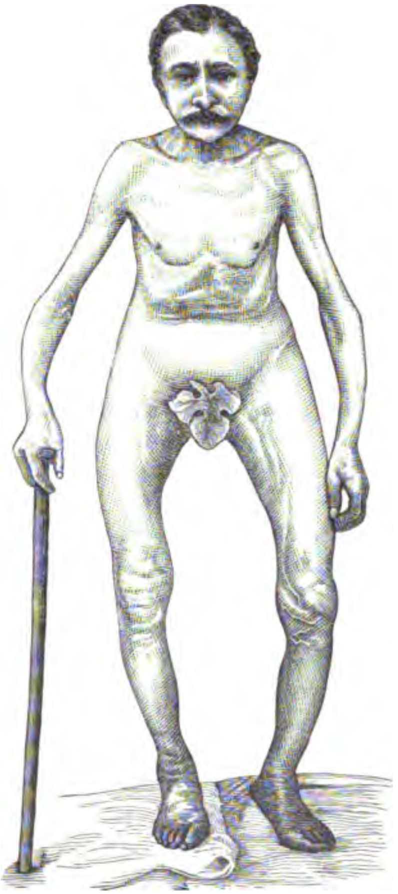

Fig. 10.—A. Robin's case. (Nouvelle Iconographie de la Salpêtrière, 1894.)
Fig. 11.—Gombault's case. Ibid.

So characteristic is the deformity in well-marked cases that it has seemed well for us to reproduce here Paget's original illustrations, with a few others from the literature. (See Figs. 6, 7, 8, 9, 10, and 11.) We would draw particular attention to the diminution in height, the curious deformity of the shape of the chest, the forward bowing of the head, the lozenge-shaped abdomen, the transverse sulcus running across the abdomen, the broadening of the pelvis, and the outward curvation of the lower extremities. To all these points attention has been drawn by previous writers. They make up a clinical picture which should not escape observation.

The relative frequency of malignant growths, which was first pointed out by Paget in his original communication, and which has been frequently mentioned by later writers as characteristic of the disease, would hardly seem borne out by a review of cases in the literature. Among them we find that 1 case (Clutton's) had a history of cancer in the family. Out of 66 cases, 3 had cancer. Including our own case, making a total of 67 cases, 5 had sarcoma; 2 cases had tumors of non-malignant nature. In 1 case (Lyon's) there was combined osteitis deformans and arthritis. From these facts it would seem that possibly too much stress has been laid on this association in the accounts found in the text-books. When we bear in mind that this disease is especially prone to affect those beyond middle age, it is not surprising that about 4.5 per cent. of the cases had cancer, although the high percentage of 7.5 per cent. of sarcoma must have some significance.

DIAGNOSIS. The chief difficulty in the matter of diagnosis is the determination as to whether a given case of deformity involving but one long bone is an incomplete case of osteitis deformans or whether it should be considered as a purely local affection. In some of the cases in the literature this question cannot be decided. The simultaneous involvement of more than one bone, particularly if the two bones be far removed from each other, and therefore not affected by a possible local cause, should make us suspicious of osteitis deformans, providing no manifest cause, such as syphilis or malignant growth, could be assigned. The differential diagnosis of this disease from others which apparently are somewhat closely allied to it, in being, so far as we can at present see, disorders of the growth of the skeleton, should not be a matter of difficulty. In mollities ossium, to which disease this seems certainly to bear some relation, there is not the same thickening of the bones as is seen in this disease, nor is the head involved. In fragilitas ossium we have deformity produced by the fractures which have taken place, but, except for the thickening around these fractures, there is no hypertrophy of bone. Acromegaly shows but few features in common with this disease, while it differs from it in the shape of the head, in the seat of the deformity and in the character of the latter. In osteitis deformans the cranium is triangular, with the base upward; in acromegaly the base is below, from the fact that in the former disease the calvarium is chiefly involved, while in the latter disease the lower jaw and orbital arches are involved far more than the calvarium. From leontiasis ossium this disease differs in the fact that the bones of the face are not affected, or only slightly, in osteitis deformans, while in hyperostosis cranii the long bones escape. To giantism this disease has not even superficial resemblance; in fact, the patient's stature is diminished owing to the bending of the long bones and to the almost constant dorsocervical kyphosis.

TREATMENT. Occasionally in the literature the statement is found that the pains accompanying the development of this disease seemed to be relieved by the use of iodide of potassium. In a far greater number of cases, however, the use of this drug has been productive of no relief, and, so far as we could find, there was no evidence of its producing any diminution of the size of the bones in cases which are evidently osteitis deformans and not simply osteitis due to syphilitic infection.

PATHOLOGY. The characteristic features of the morbid anatomy of osteitis deformans can be summarized as follows:

Skull. The distinction between the outer and inner table and the diploë is entirely lost. The entire thickness of the cranium is composed of finely porous bone substance, bounded on the inner and outer surfaces with a thin plate of harder bone. Microscopically the porous substance is seen to consist of a network of thin bony processes. The canals of the Haversian systems are enlarged and confluent, evidently the result of absorption. In the lacunæ, representing the normal medullary substance, are numerous giant cells, leucocytes, and fat cells, contained in a network of vascular connective tissue. Running through the affected areas, and seen as well in the healthy portions of the skull, when such are present, are bands of new-formed bony tissue. The osteoblasts of this new bone, while present in considerable numbers, are not as plenty as in healthy growing bone, and are irregularly arranged. The branching processes of the new canals are shorter than normal or are entirely lacking. The important characteristic of this attempt at regeneration is that the new substance remains uncalcified, and is in time reabsorbed. The border line between the new and old bone is sharply defined, indicating that the two processes are in no way connected. Most observers state that the regenerative process originates in the periosteum, or from the dura, while von Recklinghausen holds that it comes from the medulla. In our own sections the new tissue appears to come from the periosteum.

The result of the combination of these absorptive and regenerative processes is a total destruction of all symmetry in the internal structure of the skull or long bones.

As a rule, the presence of the uncalcified new bone substance renders the cranium softer than usual, but in some places areas of sclerotic bone tissue of ivory-like hardness are found.

In the long bones the normal relation of compact and cancellated structure is entirely destroyed. The outer walls of hard bone are represented by thin, irregular plates lying directly under the periosteum. In general, the histological picture here is the same as that of the skull, except that the medullary substance is more fatty, and that certain changes are observed that von Recklinghausen classes as retrogressive and progressive. The result of the former is the production of cysts filled with gelatinous substance. The progressive changes produce fibrous tumors or giant-celled sarcomata. The latter are sometimes found in the skull, as in the case here reported, but are rare in this position.

In the bodies of the vertebræ the histological changes are practically the same as in the skull.

A consideration of the morbid anatomy of the various bony structures affected in osteitis deformans readily explains the clinical features of the condition. The thickening of the cranium and of the long bones is due to the formation of a symmetrical new bone tissue. In the long bones and vertebræ the fact that this new tissue remains uncalcified and that the compact substance is being continually absorbed causes weakening, and the bending that results in the characteristic deformity of the disease. The tendency to fracture, seèn in osteomalacia, is absent in osteitis deformans, since the presence of uncalcified new bone has a tendency to make the bones elastic and not easily broken.

Etiology. Up to the present time there is no thoroughly satisfactory explanation of the conditions necessary to produce the lesions of osteitis deformans. However, it may be of interest to briefly review the various theories that have been advanced. Von Recklinghausen holds that the process of absorption is a true osteomalacia associated with inflammatory processes, which commences synchronously with the destruction of the bony tissue, and leads to the transformation of the medullary substance into fibrous tissue. From this the processes of new bone grow out. The exciting cause, in his opinion, is mechanical. He bases his theory on the following facts:

1. That the cysts and sarcomata in the medulla, which he considers to be the first manifestation of the disease, occur at those points where the skeleton is most exposed to violence.

2. That the thickening occurs at the points of greatest strain—that is, in the shafts of the long bones and in the vertebræ.

3. That the skull is often affected, because it is exposed to extremes of heat and cold to a greater extent than is the rest of the body. These conditions act largely through their effect in producing contraction in the bloodvessels.

Paget thought that the whole process was inflammatory, associated with absorption, and explains the occurrence of the connective tissue in the medulla as a result of inflammatory hyperplasia.

Stilling thinks that the absorptive process is the result of a rarefying osteitis with its usual accompaniment, the formation of new bone which, however, remains uncalcified.

Lancereaux has advanced the theory that the new bone formation is an attempt at reinforcement of the long bones which have been weakened by absorption. This view is rendered untenable by the fact that the new tissue is formed not upon the concavity, but upon the convexity of the deformed shafts.

None of the last three authorities advance any theories as to the immediate cause of the disease. The theory that the exciting cause is mechanical renders it necessary to assume some predisposing condition, and up to the present time no satisfactory explanation has been advanced. It has been asserted by some that the process is a trophic one, associated with lesions in the nervous system. Stilling found a periependemal sclerosis in one of his cases. Von Recklinghausen describes masses of round cells around the bloodvessels of the cord in one instance. Gilles de la Tourette and Marinesco and Levi demonstrated sclerosis of the posterior and lateral columns and much degeneration of the bloodvessels of the cord. However, the absence of all clinical evidence of trouble in the nervous system and the results of many examinations that have shown the cord and bone nerves (von Recklinghausen) to be perfectly normal render it unlikely that the lesions referred to have anything to do with the origin of the condition.

DIAGNOSIS. The diagnosis between osteitis deformans and other affections of the skeleton of somewhat similar character is not difficult when based upon a study of the distribution of the lesions and their pathological histology. The disease most closely allied is osteomalacia; indeed, the two affections merge into one another. The main point of difference is that in osteitis deformans synchronously with the absorptive process a process of regeneration takes place. The callus that forms about the fractures that are so common in osteomalacia somewhat resembles the new bone of osteitis deformans, except that it is localized about the seat of a fracture. It often shows a lack of calcification. Moreover, fractures do not occur in osteitis deformans. The absorptive processes of both diseases are practically identical in their origin and appearance.

Leontiasis ossea affects the bones of the face, and the histological picture is that of osteo-sclerosis. The same may be said of hyperostosis cranii and gigantism.

Several writers upon the subject, especially Lancereaux and Richard, have made an effort to show that arthritis deformans and osteitis deformans were different manifestations of the same disease. They claim that both originate in some trophic disturbance, and in one the joints and in the other the shafts of the long bones and the skull are affected. Their evidence has been entirely clinical, and consists of several cases in which the two diseases appeared to be coexistent. No autopsy upon an undoubted case of osteitis deformans has borne out their theory.

Our conclusions from the study of this case and of the literature of osteitis deformans would be as follows:

A. From the Clinical Stand-point.

1. Beside our own case 66 true cases of osteitis deformans are found in the literature.

2. Osteitis deformans is a distinct disease of obscure etiology, but possibly allied to although not identical with osteomalacia, fragilitas ossium, and acromegaly.

3. The disease is one especially of later adult life, although its onset has been noted at as early a period as the twenty-first year. Of the 67 cases, 61 per cent. occurred in males, 35 per cent. in females. In a small number of cases trauma has seemed to play a part in the etiology. There is very little evidence of a family tendency to the disease, although there are a few examples in the literature.

4. The subjects of the disease bear a striking resemblance to each other in their general characteristics, the most noteworthy features of which are enlargement and forward projection of the head, dorso-cervical kyphosis, the prominence of the clavicles, the spreading of the base of the thorax, the diamond-shaped abdomen crossed by a deep sulcus, the relative increase in the width of the hips, and the outward and forward bowing of the legs.

5. The bones most frequently affected are those of the cranium, the tibiæ, and the femurs, in the two former of which the deformity was usually first noted. There is a curious preponderance of cases wherein the left side was either first or most involved, although at times it was noted that the enlargement was crossed so that the lower extremities of one side while the upper extremities of the other were involved to the greatest degree.

6. The association with malignant disease, while present in our case, would seem to be not quite so frequent as is usually stated.

B. From the Pathological Stand-point.

1. Osteitis deformans is a disease affecting the skull, vertebræ, and certain of the long bones. Its essential pathological characteristics are:

a. Absorption of the compact substance causing enlargement and confluence of the Haversian canals.

b. Formation of new bone which runs diffusely through the affected and the adjacent healthy portions. This new bone remains uncalcified, and is in turn reabsorbed.

c. The conversion of the medullary substance into a vascular connective tissue containing fat cells, giant cells, and leucocytes. In a small proportion of the reported cases cysts filled with gelatinous material and giant-celled sarcomata occur in the medulla.

d. As a consequence of these three processes, the ordinary relations of the compact substance and medulla are destroyed. The bones become exceedingly thickened and asymmetrical, but since the new bone tissue remains uncalcified its elasticity permits of great deformity of the long bones from the weight of the body, and fractures do not occur.

2. The whole picture of osteitis deformans from its pathological aspect is so very characteristic that it must be considered a distinct disease, and its pathological diagnosis is correspondingly easy.

3. The etiology of the condition is as obscure as when Paget first described it. Some predisposing tendency, probably trophic, must be assumed, and the exciting cause may be mechanical; in the skull, extremes of heat and cold, and in the vertebra and long bones the ordinary traumata to which these bones are exposed. Lesions of the nervous system are inconstant and rare, and are probably not a causal factor.

ASYMMETRY OF THE NASAL CAVITIES.[1]

By A. Coolidge, Jr., M.D.,
of Boston.

In this community at least asymmetry of the nasal passages, to a greater or less degree, is so common that it might almost be considered the rule rather than the exception. It is found in those persons who practically never suffer from any disturbance of nasal function as well as in the patients in our clinics. It has been shown by Harrison Allen that asymmetry of the nasal passages may exist without deflection of the septum, but in the great majority of cases a deviation of the septum is the most prominent feature of the asymmetry. The etiology of these deviations, the forms which they may take, their frequency among different races, have been so often and so completely described that I need simply refer to papers by Ingals, Delavan, Bosworth, MacKenzie, Harrison Allen, and Roe, and to the works of Morrell McKenzie, Welcker, Ziem, Stoker, Rosenthal, Sendziac, McDonald, Collier, and especially Zuckerkandl.

In the literature of the subject of deviations of the septum and of asymmetry of the nasal fossæ are frequent references to changes in the shape of the turbinated bodies, commonly found in connection with these deviations. Of these, the most noticeable is an enlargement of the turbinates opposite the concavity of the septum. Considering the large amount that has been written about the asymmetries of the septum, it is perhaps strange that more attention has not been given to these coincident asymmetries of the other intranasal structures. It is commonly observed that in cases of deflection of the septum the turbinated body opposite a concavity is enlarged and the one opposite the canvexity is small. This readjustment is formed partly by changes in size or in shape of the bones, and completed by the soft parts. Not only is the turbinated body as a whole enlarged, or contracted, but localized projections from the septum, as a spur or ridge, may be accompanied by a localized depression in the turbinate opposite to it. By examination of skulls it is evident that these changes are not confined to the turbinates, but often include the ethmoid cells, and sometimes the walls of the maxillary antra.

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[1] Read before the American Laryngological Association, 1901.

The etiology of these asymmetries has received the attention of several writers, with varying results. In brief, the causes assigned come under one of three heads: First, that the deviation of the septum is primary, and the accompanying changes in the turbinates are due either to changes brought about by the inspired air current, or to pressure on the turbinate. Second, that deviation of the septum is secondary, caused by a primary change in the shape of the turbinates. Third, that both the deflected septum and the asymmetrical turbinates and outer wall are due to a common asymmetrical development. The enlarged turbinate is sometimes referred to as an accidental pathological hypertrophy, but often it is looked upon as compensatory—as helping to fill up a cavity which would otherwise be too open.

Nineteen years ago Delavan, in a paper on "The Question of Hypertrophy of the Osseous Structure of the Turbinated Bodies," discussed the hypertrophy of bone as well as of soft parts, especially in connection with deflected septa. I do not know that there is to-day a better argument on that subject. He points out the peculiar intimate relations between the mucous membrane of the turbinated body and the bone, and concludes that "the conditions favorable to the hypertrophy of the turbinated bone would seem to be (1) unusual space in the nasal fossæ; (2) long-continued hyperæmia of the structures investing the bone; (3) the existence of the above conditions during the period of greatest constructive activity."

Bosworth says: "It is necessary for the development of these hypertrophic changes that air should pass through the fossa. We, therefore, find it an invariable rule that the greatest extent of hypertrophy develops on that side which is most open, for in no case of a deflected septum is the extra width of one passage competent to supply the deficiency of the other."

Bryan, while following Bosworth's view of the influence of the air tension in producing hypertrophy, protests that it seems overdrawn. Greville MacDonald considers that there is both a true hypertrophy and an engorgement of the inferior turbinated body, and that it would appear to be a physiological attempt to compensate for the abnormal width of the fossa, and should not be lightly interfered with.

Lennox Browne regards the hypertrophy as compensatory rather than as simply pathological. He says: "Deflections, while causing stenosis of the meatus into which they protrude, naturally increase the patency of the opposite side; but increase of function is apt to render the turbinated bodies on this open side liable to compensatory hypertrophy. This secondary overgrowth or vascular turgescence may take place to such an extent that stenosis will be produced, which will demand treatment; but it often happens that a deviated septum having been rectified, the compensatory hypertrophy of the turbinals of the opposite side will spontaneously undergo partial and sufficient resolution."

Roe points out that as the air in respiration should be equally divided between the two sides, the hypertrophy may be a compensation of nature for this extra work. He says: "The hypernutrition has been caused by the irritation consequent upon the excessive amount of air passing through the unobstructed passage."

Ziem, in 1883, traced a connection between unilateral nasal obstruction and nasal and facial asymmetry. By obstructing one nasal passage in young animals he concluded that the restriction of respiration retards, and functional activity increases, the development of the nasal structures.

During the last few years renewed attention has been directed toward the influence of a restriction of the normal air current on the development of the bones of the face and nasal passages. It has long been very commonly accepted that adenoid hypertrophy in the vault, by restricting respiration, is the principal cause of certain peculiarities in the development of the facial bones. This has, to a greater or less extent, been doubted or denied, especially in the last five years, by Fränkel, Siebenmann, and Grossheinz, who conclude that the high arch and narrow face are together forms of skull development independent of nasal stenosis. So far as normal development is dependent upon normal function, we should expect asymmetrical development in cases of unilateral obstruction to respiration.

An interesting study is offered by certain reported cases of congenital occlusion of the posterior nares by a bony plate. In some of these cases the occlusion was unilateral, in others bilateral. The patients had lived since birth with absolutely no passage of air through one or both nasal passages.

An extreme advocate of the influence of the air current as the causative factor in abnormal development of these bones should expect to find symmetry, but extreme high palate in cases of bilateral occlusion and marked asymmetry where the occlusion was unilateral. That such is seldom the case shows that other elements must be considered. In most of the reported cases, although the facial and nasal index have been carefully measured, I have not been able to find very satisfactory descriptions of the relations of the turbinates to the deflections of the septum. I have myself seen two cases of choanal occlusion, one bilateral, the other unilateral.

The first case, bilateral, has been reported by Clark. A girl, aged eighteen years, had been unable to breathe through the nose at all since birth, on account of the complete occlusion of both posterior nares by bony plates. The septum was markedly deflected to the left, forming a concavity in the right nasal chamber. The right lower turbinated bone was enlarged and projected toward the concavity. On the left side there was a ridge on the septum and a small and retracted turbinated body.

The second case was a Swedish girl, a domestic, aged eighteen years. I first saw her in September, 1897. She had never been able to breathe through the right nostril. She breathed easily through the left side, and was not obliged to open her mouth except on exertion. The posterior rhinoscopic mirror showed a normal choana on the left; on the right was a smooth surface, with no visible line separating it from the vault or from the septum. This was a bony plate, which I subsequently removed. There was no marked high arching of the palate, nor facial asymmetry. The left nasal cavity was normal, except that the septum was deflected to a moderate extent into this side, with a corresponding concavity in the occluded right side. The lower turbinate in the left side was retracted, leaving good space for respiration. In the right side the lower turbinate bulged toward the concavity to an extent which made it slightly difficult to reach the obstruction with straight instruments. The soft parts of the turbinated body were somewhat pale and collapsed, but the bone in general followed the curve of the septum.

Haag has collected the reports of 44 cases of occlusion of the choanæ, of which 20 were bilateral and 16 right-sided and 8 left-sided. In only 3 of the unilateral cases was there marked facial asymmetry. In 1 of these the septum was straight and the nasal passages were of equal size. In 5 of the unilateral cases the septum deviates toward the occluded side. In the others it is either normal or not mentioned. In 1 bilateral case there was facial asymmetry, and in at least 2 deviation of the septum. Subsequently, Morf and Baurowicz have reported cases with the same conclusions. In many of the cases reported the turbinates in the obstructed nasal cavities were normal except that they appeared pale.

These cases tend to prove that the influence of the respiratory air current, or functional activity, on the development, or on pathological changes in shape of the intranasal structures, is at least limited. In a case reported by Dr. C. H. Knight, in 1888, and in similar ones by Schoetz, Anton, and Simon, of unilateral occlusion, the concave side and the large turbinate were found on the unobstructed side. Here it might be argued that the hypertrophy was caused by the air current, but in most of them the deflection was slight, and the single nasal passage admitted sufficient air for nasal respiration. In my case the septum was deflected toward the unobstructed side.

That the adjustment of the turbinates may be due to the increased or diminished space in the nasal passage has already been referred to. A temporarily engorged turbinated body might be compressed by a convexity of the septum or by a spur sufficiently to affect its growth, or in the concave side, meeting no resistance, it might be stimulated to increased growth. This might be communicated to the ethmoid cells, so that they also would take part in the process. If we accept this as a sufficient explanation, we must acknowledge that the ethmoid and turbinated bones are especially endowed with a very sensitive nutritive adaptability.

Baumgarten, Woakes, Seiler, and others have suggested that the deviation of the septum may be secondary to the enlargement of the turbinates. This view seems to have many arguments against it. It is hard to see why the turbinated bones of the two sides should so act in harmony; neither is it likely that a part of a lower turbinated bone receding from a spur should be the cause and not the effect of the spur. Also, the septum is especially liable to deformity anterior to the turbinated bones, where the external nasal walls are symmetrical and unyielding. Cases of atrophic rhinitis may present deviations, although the type of face in which ozæna most frequently occurs is that in which asymmetry of the fossæ is least common. That an abnormally large middle turbinate may deflect the septum, and this in turn cause a retraction of the middle turbinate and ethmoid cells of the opposite side, is suggested by Zuckerkandl in connection with one of his plates.

It has also been suggested by Welcker, Ziem, Schaus, and others that neither of the deformities is secondary to the other, but that both are the result of a general asymmetry of the whole region. Bosworth, commenting on the observation of Schaus, speaks of "scoliosis, as it were, of the whole face." Ingals, in 1882, showed a relationship between deviations of the external nose and of the septum. These irregularities either first appear or are much increased during the growth of the intranasal structures at about the time of puberty. Walsham says briefly: "The vomer is pushed downward and forward by the rostrum of the sphenoid, carrying with it the perpendicular plate of the ethmoid, together with the nasal bones and the external table of the frontal, to which these are attached. If anything interferes with this forward extension it will cause deviation of the septum."

Whatever the mechanism may be by which one intranasal structure is modified to fit another, there seems to be no doubt but that nature has some method by which the air-carrying capacity of the two sides can be kept approximately equal. The following, from Sir James Paget, quoted by Delavan, seems appropriate here: "Hypertrophy of bone presents itself in many interesting cases. It is usually a secondary process, ensuing in consequence of change in a part with which some bone is intimately connected. Just as in their natural development and growth the bones of the skull are formed in adaptation to the brain, and those of the limbs are framed to a fitness of the action of the muscles, so in disease they submit in their nutrition to adapt themselves to the more active parts." As the function of the nose is to transmit and modify air, should we not expect to find the bones adapting themselves to this function?

The delicate physiological balance of the nasal organ is well known. The size and shape of the air-carrying passages in the nose are of the greatest importance for its proper physiological functions. This physiological balance would be entirely destroyed by a deviation of the septum unless a corresponding anatomical balance were established. As can be seen on a cross-section through symmetrical nasal chambers, even a slight deflection of the septum would open one passage and narrow the other, so that a large proportion of the air would go through one side. May we not assume, then, that if asymmetry is present in one structure, asymmetry of neighboring structures must be looked upon as physiological rather than as pathological? In other words, these secondary changes subtract from rather than add to the departure from typically perfect conditions.

In a nasal cavity in which this adjustment has not taken place, where, for instance, a turbinate opposite a concavity is small, leaving a wide passage, there is always present some pathological change, or at least a disturbance of function. Also, in the opposite or narrowed cavity, unless the turbinate recedes, there must necessarily be an appreciable obstruction to the passage of air. The greater the deviation the more the nasal passages become defective as an organ for respiration. Compensatory shrinking is limited on the convex side, and the hypertrophy of the concave side often becomes excessive. In front of the turbinates, where the cartilaginous septum may bend toward an unyielding nasal process of the superior maxilla, there can be no readjustment, and a sufficient deflection of the septal cartilage causes a unilateral obstruction perfectly obvious to the patient. Many cases of obstruction requiring operative interference, and most of the methods for straightening the septum come under this head. The object of these operations is to open a passage into the nasal cavity proper.

So well is the function maintained that most persons with deviating septa, provided the deviation is not so far forward as to block the passage anterior to the turbinates, are unable to tell which nasal cavity has the greater capacity, and no one, surely, is surprised to find many asymmetrical nasal passages in persons who never have the slightest trouble with their noses.

Turning briefly to the practical bearing of these large turbinates where, on account of obstruction to breathing or for other cause, it is advisable to straighten the passages, we are told by some of the writers whom I have quoted that the large turbinate should be reduced before the septum is straightened, by others that nature's process of readjustment will be sufficient to take care of the redundancy of the turbinate. My belief is that there is truth in both assertions, each in its proper case. To one rule of treatment I think that there will be no question. A turbinated body should be judged by the distance between it and the septum, and not by its absolute size.

In closing, I would present the following propositions for discussion :

1. In cases of deviation of the septum, the common asymmetries of the other intranasal structures should be classed as physiological compensatory changes.

2. As a rule, these changes in the turbinated bodies and ethmoid bone are not due to increase or diminution of the air current. Neither is the deflection of the septum often secondary to asymmetrical turbinates.

3. Whatever may be the mechanism which underlies this adjustment, the ethmoid and the turbinated bones are especially endowed with nutritive adaptability, and in consequence are able to minimize the disturbance which a deflecting septum would produce. Slight deflections are often rendered entirely innocuous, more extensive ones partially so.

4. The entrance into the nasal cavities proper cannot share in this readjustment, and here a deflection of the cartilage of the septum soon becomes obstructive.

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A CASE OF ACUTE LEUKÆMIA PRESENTING SOME INTERESTING FEATURES.[1]

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THE accompanying case might not be deemed worthy of report because of the incompleteness of the record were there not very special features of interest that demand its publication. The patient was in the writer's wards of the Episcopal Hospital, in the spring of 1899, for thirty days prior to her death.

She was admitted with symptoms which, several inspections of the blood showing evident leukopænia, caused the diagnosis of scurvy to be made. These were: Spongy, hemorrhagic gums, with looseness of the teeth, fetid breath and furred tongue, an anæmic appearance, and a tendency to nose-bleed. The patient had been debilitated since the birth of her last child, three months before, and the above symptoms had since developed. Appropriate treatment for scorbutus was ordered, and but little further attention was paid to the case until she was well into what appeared to be an attack of typhoid fever.

The history is as follows:

Ann S., aged twenty-eight years; birthplace, Philadelphia; occupation, housework. Admitted to the Episcopal Hospital on April 11, 1899. Died on May 11, 1899.

Family History. Father said to have died of heart disease; mother of insanity. Otherwise, family history negative.

Previous History. Had measles when a child. No other infectious disease. Fairly healthy until lately, save that she had had a bad diarrhœa after the birth of one of her children. No specific history; never had had chills and fever. Married for nine years; five children; last child born three months before admission. Had nursed child for one month. She was of slender build, and her complexion was said to have been always pallid.

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[1] Read before the Association of American Physicians, 1901.

Present illness began some two or three months before (about February, 1899), shortly after the birth of her child. Then the gums became swollen and bled easily. There has since been a tendency to nose-bleed, but no hemorrhage from other parts of the body. On admission it was noticed that the patient presented a rather anæmic and markedly ill-nourished appearance, which she said was habitual with her. There was a history of overwork and privation. The gums were much swollen, soft, and spongy, almost covering the teeth in places, and tended to bleed easily. There had been no salivation, and she had not taken calomel. The teeth were quite loose, and the breath very foul, the tongue swollen and furred. The heart sounds were enfeebled. No murmurs were present. Indications of enlargement of the external lymph glands were not evident, and the area of splenic dulness was little increased over the normal.

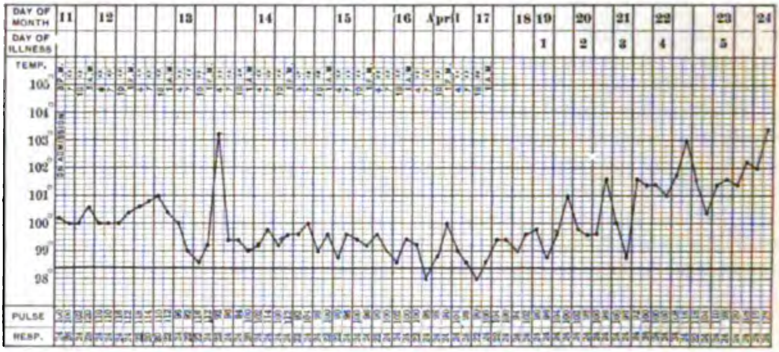
An inspection of the blood by Dr. Ghriskey, on several occasions during the first week of admission, invariably showed a diminished number of leucocytes, a number of fields having to be covered for one to be seen. Red corpuscles pale, not distorted. No estimation of red or white corpuscles was then made.

An astringent mouth-wash was prescribed. She was given a nourishing diet, containing such green vegetables as could be procured, and expressed meat juice and lemonade. Tincture of iron in syrup of lemon was prescribed, and a moderate amount of strychnine and whiskey ordered. Her temperature from the day of her admission is as recorded on the accompanying chart.

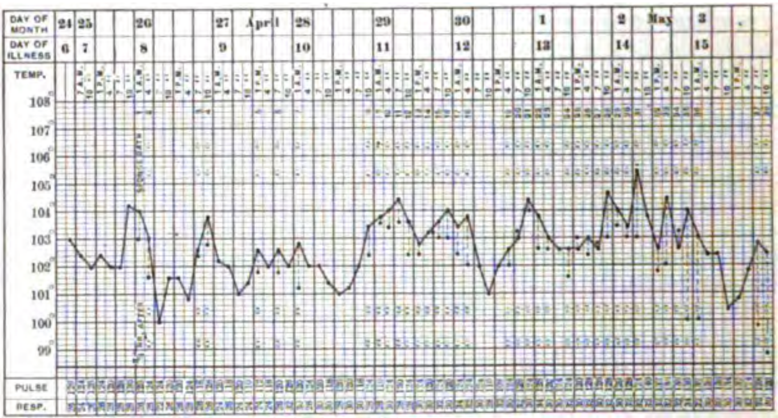
On the day of her admission (April 11th) and that following it varied from 100° to 101°, reaching 103.1° on the 13th, but subsequently, until April 19th, it did not exceed 100°. It had then begun to show a gradual rise suggestive of typhoid fever.

There was a great deal of typhoid fever in the wards at the time, and, coincident with the occurrence of the more or less characteristic temperature rise, it was suspected she was developing this disease. During the latter part of April her spleen, which on admission had not been palpable, became notably so. There was diarrhœa, and spots appeared on the abdomen, which superficially resembled the rash of enteric fever, and on May 2d the blood was reported to give a typical Widal reaction. The examination was made at the City Laboratory by Dr. A. H. Stewart from a dried specimen. Unfortunately, a second specimen was not sent. The abdomen had become distended, and there was marked tenderness in the right iliac region.

On May 7, 1899, it was noted that the rash had become general, and was unlike that of typhoid fever. The spots had much increased in size, and in places were becoming purpuric. Much aching was complained of in the extremities. The breath was highly offensive; the gums hemorrhagic and sloughing at several points. The heart sounds were much enfeebled. The spleen had become much enlarged, and was palpable two finger-breadths below the costal margin. The bowels were now very loose. An inspection of the blood, which had not been made since the first week of admission, showed an extensive leucocytosis, the large mononuclear cells prevailing. The report was: Leucocytes, 89,600; erythrocytes, 1,280,000; hæmoglobin, 25 per cent.


DAY OF MONTH
11
12
13
14
15
16
April
17
18
19
20
21
22
23
24
DAY OF ILLNESS
1
2
3
4
5
TEMP.
105°
104°
103°
102°
101°
100°
99°
98°
PULSE
RESP.

1


DAY OF MONTH
24
25
26
27
April
28
29
30
1
2
May
3
DAY OF ILLNESS
6
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9
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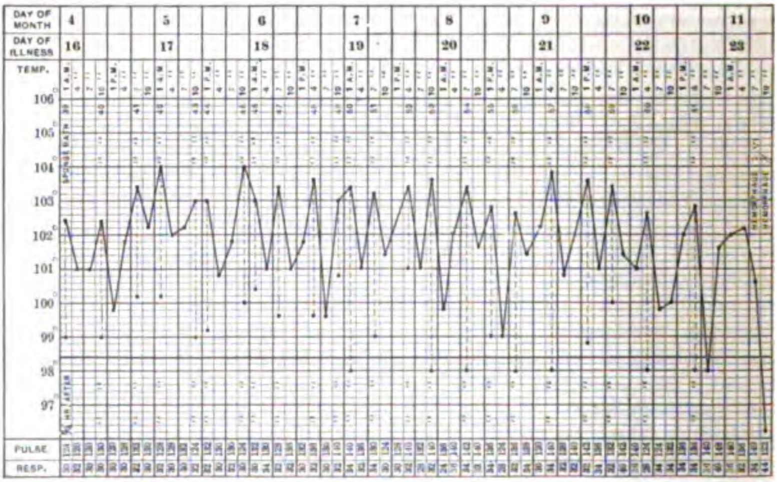
11
12
13
14
15
TEMP.
108°
107°
106°
105°
104°
103°
102°
101°
100°
99°
SPONGE BATH
PULSE
RESP.

2


DAY OF MONTH
4
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DAY OF ILLNESS
16
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TEMP.
106°
105°
104°
103°
102°
101°
100°
99°
98°
97°
SPONGE BATH
PULSE
RESP.

3

Urine (catheterized specimen) turbid, contains numerous whitish flakes in suspension; reaction acid; albumin, marked trace to heat and acid; microscopically, numerous leucocytes singly and in clumps; granular and epithelial casts; many erythrocytes.

On May 9th it was noted that the purpuric rash had become more or less general, and tended to be confluent. Leucocyte estimation, 102,000.

11*th*. Leucocyte estimation made, but report missing. It is recalled that the count was considerably in excess of that of the 9th instant. She had a moderate hemorrhage from the bowel on the evening of the 10th, and a very large one the following morning. This was followed by symptoms of collapse. Despite repeated hypodermoclysis and other measures to restore her, she died on the evening of the 11th. In the last week of the illness diarrhœa was excessive.

Pathological Report by Dr. Robertson.

" Necropsy made six hours after death. Body of a rather emaciated woman. Purpuric spots over abdomen. Gums soft and swollen, and overlapped teeth more than normally. Subcutaneous fat greatly diminished. Musculature very poor.

"*Thorax.* Pericardial fluid normal in appearance and amount. Heart muscle pale and flabby. Valves and orifices normal. Weight, 256 grammes. Hemorrhagic foci on visceral layer of pericardium. Lungs: Calcareous nodule in apex of right lung, otherwise both are normal throughout.

"*Abdomen.* Stomach low in position. Kidneys: Both movable, the right one freely, the lower margin being on a level with the crest of the ilium, though some attachment still remained, being formed by the original perirenal tissue, which had been converted into a long band. Both kidneys pale on section, cortex widened, due to parenchymatous degeneration. Right kidney weighed 208 grammes; the left 256 grammes. Liver enlarged, rather pale, seat of parenchymatous degeneration. Spleen much larger than normal; weight, 432 grammes. Quite firm, unlike that which one finds usually in typhoid infection. Intestines: small bowel contained no ulcers. Peyer's patches distinctly visible, owing to numerous small pigmented spots within them. There were no signs of inflammation anywhere. The cæcum, ascending and transverse colon contained numerous deep, ragged ulcers, many with black, hemorrhagic sloughs, partly separated. A few of the ulcers were perilously near perforation, the serosa alone remaining, and this latter, on its peritoneal surface and the juxtaposing peritoneum, was congested and roughened. Blood clots were found in the large bowel. These ulcers did not resemble any typhoid ulceration that I have ever seen. They were very irregular in outline, and the erosion itself seemed to have progressed with varying degrees of rapidity in the same ulcer, hence the bosselated character, the unevenness of the base. The appendix, which was very long, contained two small ulcers near its tip. Unfortunately, no special study of the bone-marrow was made, the ribs and sternum alone being examined, and here it was normally of the red variety. The inguinal, mesenteric, and peribronchial lymph glands were enlarged and firm.

" Microscopically the ulcerated portion of the intestine appeared as follows: The mucosa was completely necrotic, and sections stained with thionin showed numerous micro-organisms, chiefly bacilli and streptococci. These had not penetrated very deeply into the submucosa. The lymphoid tissue had been infiltrated with plasma cells and large and small lymphocytes, so that as a matter of fact the normal adenoid tissue had been obliterated. Numerous plasma cells and mast cells were found scattered throughout the submucosa.

"*Spleen.* Vessels thickened. Malpighian corpuscles much less marked than normally, being apparently largely displaced by the very richly cellular parenchyma. Plasma cells and large endothelial cells seem to make up the large part of these. No bacteria could be found.

"*Lymph Gland.* The normal arrangement of a lymph gland is totally lost. It is very rich in cells, plasma and endothelial cells, the latter apparently descendants of the cells lining lymph vessels and spaces. Small and large lymphoid cells, aggregated into groups and surrounded by attenuated fibrous tissue, an approach to the normal, were only found at the periphery of the gland. No micro-organisms found.

"*Liver.* Parenchyma cells swollen and granular, the seat of parenchymatous degeneration. No increase of connective tissue or bile ducts, but here and there aggregations of lymphocytes and connective-tissue cells.

"*Kidney.* Seat of parenchymatous degeneration. Moderate congestion. About the glomeruli and between some of the tubules, particularly in the neighborhood of the glomeruli, were aggregations of plasma cells and large lymphocytes.

"*Heart.* An interstitial collection of plasma and connective-tissue cells, and a few lymphocytes. Muscle fibres stain well.

"From the histological examination the picture is that of any of the acute infections, plus the great increase of lymphocytes. The plasma cell has been found particularly in typhoid and diphtheria, but is met with in other infections also, though I scarcely think in as great numbers. How large a part they play in scurvy or acute leukæmia I do not know."

Specimens for microscopical examination were also submitted to Prof. Simon Flexner. The following is his report:

"*Intestine.* The section of intestine consists of a nodule equally within the mucous membrane and the adjacent tunics, including a portion of the omentum. The nodule occupies the whole of the mucous membrane as far as contained within the section, with the exception of a fragment of tissue at one end, in which the crypts of Lieberkuehn are still present. With this latter exception the entire tissue is degenerated and refuses to take the staining agents. The remainder of the membrane is made up of cells separated by a stroma, in some places coarse in texture and in others fibrillar. The degenerated edge goes over quite sharply into the cellular layer, and there the line of demarcation is occupied by brightly staining cells and intercellular tissue.

"As regards the preserved portion of the cellular infiltration, it consists of cells of large size, possessing vesicular nuclei, the latter being reticulated, and an abundance of protoplasm. Among these are small cells resembling lymphoid cells in all particulars. Many of these cells show karyokinetic figures. These figures are especially marked in the large cells described. They exist throughout the nodule, are about uniformly distributed, and in the preserved edge of the tissue, just below the degenerated tissue, are present as described. These dividing cells show all stages from the simple dividing aster to the completely divided nucleus; rarely four or five nuclei are found contained within a single cell. The infiltration described involves the mucous membrane and submucosa, so that no distinction can be made out in these two tunics. The muscular coat, on the other hand, is less uniformly affected, but in it are islands of cellular tissue, presenting the same characters as those of the mucosa and submucosa. The cells composing the nodules are made up chiefly of the larger cells described. Among these there is also evidence of karyokinesis. The peritoneal coat is very diffusely infiltrated with similar large cells, chiefly, although some of the smaller lymphoid cells are also present, and cell division is going on among these cells. The bloodvessels, chiefly of the muscular coat, show an increase of white elements, especially of larger white elements with single nuclei, and it is found that nodules in the muscular coat had developed about such bloodvessels and perhaps also about lymphatics. The type of large cell agrees with the type of large mononuclear leucocyte as found in the blood, and they may be considered as being alike, inasmuch as those within the vessels agree with those without the vessels. That the nodules have arisen, at least in part, by proliferation *in situ* is shown by the active karyokinesis.

"*Mesenteric Gland.* Section of this gland shows that it is not greatly enlarged. Upon microscopical examination there is seen hyperplasia of the entire gland, which largely obliterates the distinction between the cortex and medulla, and in which there are numbers of cells having the general characteristics of large mononuclear leucocytes. In these cells karyokinesis is also apparent.

"*Spleen.* Shows a considerable amount of yellow blood pigment. It is uniformly infiltrated with cells; rarely can a Malpighian body be made out. The cells are of the type of lymphocytes, the larger ones chiefly being represented. Cellular accumulations are found, especially in the pulp. Karyokinesis also appears in the large cells.

"*Liver.* The cells are granular. The capillaries contain a greatly increased number of white elements, which partake especially of the character of lymphocytes. In addition to which there are scattered nodules of cells surrounding branches of the hepatic veins especially, consisting of large lymphocytes admixed with a small number of small lymphocytes. These occupy the sheath of vessels and extend into the liver tissue and take in part its place. Karyokinesis is also to be seen among these cells.

"*Kidney.* Shows swelling and granular degeneration, and some fatty degeneration of the tubular epithelium. It also shows small hemorrhages into the tubules, and focal accumulations of the large mononuclear elements within the kidney substance, chiefly about the glomeruli.

"*Heart.* Section of heart muscle shows, first, an increase in fibrous tissue about the larger bloodvessels; second, focal accumulation of cells, chiefly of the type of lymphocytes between the muscle fibres. These accumulations are often elongated, adapting themselves to the spaces between the fibres. An occasional nucleus, such as are found in polymorphonuclears and an occasional red cell, are also found.

"*Diagnosis.* These sections come from an undoubted case of lymphatic leukæmia of the large mononuclear type. The bloodvessels contain greatly increased numbers of these mononuclear elements. From the bloodvessels they have escaped into various situations of the body, especially into the intestinal mucosa and submucosa, where they have developed with the production of leukæmic nodules."

A differential blood count was made for me by Dr. Thayer, of the Johns Hopkins Hospital, for which I here express my great indebtedness. It is as follows:

"The specimen of blood which you sent me is very remarkable. It is clearly an example of large-celled lymphatic leukæmia. I have seen similar bloods in two instances of very acute lymphatic leukæmia, in one associated with hemorrhagic and extensive areas of cutaneous gangrene. The type of blood is that which, in my experience, is associated with the most rapid and malignant type of lymphatic leukæmia. The two specimens were stained, one with Ehrlich's eosin hæmatoxylin, the other with the triple stain. In the first place the specimens stained badly. Whether with the triple stain or with other stains the ground substance between the different cells takes a distinct color, a slight, diffuse lilac stain in specimens stained with the triple stain, and a more reddish color in the eosin hæmatoxylin specimen. This is especially marked round about each leucocyte. The red corpuscles show moderate variation in size, a slight, though not great, poikilocytosis. No nucleated red blood-corpuscles were seen. There is a great increase in the number of leucocytes, which are almost entirely mononuclear. Many of these, however, show nicks and divisions in the nucleus, for the most part not like those occurring in the ordinary development of the polymorphonuclear leucocyte. The most striking feature about the specimen is the almost absolute lack of granules. Scarcely a single element containing undoubted neutrophilic granules has been found. After considerable search a single eosinophile was seen. The mononuclear elements consist of typical small lymphocytes with deeply staining nuclei, which nearly fill the cell body, and of elements larger than these all the way up to bodies larger than the ordinary polymorphonuclear cells. These, as has been said, show in many instances nicks which are sometimes deep, so as occasionally almost to divide the nucleus in half. On account of their general similarity in character to the larger mononuclear cells, these have all been classed as mononuclear elements. The protoplasm of some of these elements is deeply staining, of a brownish or slightly lilac color, of others with grayish, and of others nearly colorless. The number of cells with nuclei like those of the ordinary polymorphonuclear leucocyte was small. A differential count of a thousand leucocytes showed: Typical small lymphocytes, 16 per cent.; mononuclear elements smaller than the ordinary polymorphonuclear leucocyte, usually with palely staining nucleus, some showing nicks as above referred to, 22.4 per cent.; cells as large as polymorphonuclear leucocytes or larger, with a nucleus usually palely staining, 55.6 per cent.; cells with distinct polymorphous nucleus, and some showing a suggestion of granulation, but no positive neutrophilic granules, 6 per cent. No nucleated reds or eosinophiles were found among the thousand counted."

An analysis of this case has been puzzling to me. At the time of its observation my notion was that, on admission to the hospital, it was one of scurvy, that typhoid infection had then occurred, and that the acute leukæmia had appeared as a complication of the presumed typhoid fever. The patient had been ailing for two or three months, and on admission her gums were spongy, much swollen, and hemorrhagic, and the teeth loose. Yet several inspections of the blood by Dr. Ghriskey, whose careful technique is well known, showed an evident leukopænia. It is well known that in ordinary spleno-medullary leukæmia there may be periods in the course of the disease in which, with or without extensive splenic enlargement persisting, the leucocytes approach the normal in number, or even fall below, and that the separation of such a case from ordinary splenic anæmia must be made by the persistence of myelocytes in considerable number. Ordinarily, lymphatic leukæmia is acute in onset and course. In the less common chronic cases there are, I believe, no observations showing the intercurrent existence of periods in which the leucocytes diminish to normal or fall below, and in which a high percentage of lymphocytes persists. With glandular enlargement evident, such a case would be indistinguishable from Hodgkin's disease, in certain cases of which there may be an increased percentage of lymphocytes without the total number of leucocytes being above the normal. In the present case it is difficult to conceive lymphatic leukæmia without leucocytosis and without evident external glandular enlargement, which in this case did not exist on admission, and only occurred toward the termination of the case. There, then, was moderate swelling of the cervical, axillary, and inguinal glands. In the present case I am forced to conceive a preleukæmic blood state in which, without leucocytosis, if a differential count had been made on admission, a high percentage of lymphocytes would probably have been found to exist. But as a lymphocytosis may occur in scurvy, the diagnosis of possible leukæmia would have been favored less by this than by the febrile temperature and the lack of prompt improvement in the case under an anti-scorbutic regimen. The woman was of the lower class; had for years overtaxed her strength and had been ill-nourished. She had just passed through gestation and a month of lactation, so that the conditions were favorable for the development of any morbid blood state. Bearing in mind the aping of the clinical picture of typhoid fever by acute leukæmia, it is still conceivable, though not altogether probable, that this patient had, preceding the development of undoubted acute leukæmia, a typhoid infection. Certainly spots appeared which were regarded as similar to those of typhoid,[1] and the blood was reported by Dr. A. H. Stewart, of the City Laboratory, who has had an extensive experience in such examinations, to give the typical Widal reaction.[2]

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[1] But of the minute character of which no record exists, as the condition then was thought to be typhoid fever.

[2] The Widal reaction was examined for but once, and from a dried blood specimen. We had not then begun such examinations at the hospital.

Unfortunately, cultures were not made in life or after death to determine the existence of the typhoid organism. The importance of such cultures was recognized. They were requested repeatedly, but in the very large amount of detailed labor then thrown on Dr. Ghriskey in the organization of the clinical laboratory, then in its incipiency, and who was working without an assistant, they were omitted.*

The post-mortem picture was that of an acute severe infection. The ulcers, the erosion of a vessel of one of which had caused the fatal hemorrhage, were limited to the colon. Dr. Thayer's report of the blood condition is especially interesting, in that it shows the case to belong to a type of very acute malignant leukæmia. This argues against the existence of the disease nearly four months before, at the time of the appearance of spongy gums, and with the absence of a leucocytosis on admission to the hospital a month before. My own judgment is, viewing these and other facts in the case, that the leukæmia was but in its incipiency on admission; that it had very acute onset, with the gradual rise in temperature suggestive of typhoid fever; that the earlier conditions represented a blood dyscrasia allied to scurvy, upon which the very acute and fatal leukæmia was subsequently engrafted.

TYPHOID CHOLECYSTITIS, WITH OBSERVATIONS UPON GALLSTONE FORMATION.†

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Although cholecystitis occurring as a complication of typhoid fever was recognized by Louis, it has not been carefully studied until recent years. In this country the important monographs published in 1897 by Drs. Osler[1] and Mason[2] have directed attention to this serious and not uncommon complication.

We are realizing more and more the important rôle the typhoid bacillus plays in producing pathological processes in various organs and tissues, and the list of the complications and sequelæ of typhoid fever due to the specific bacillus is still increasing.

It was not until 1887 that it was definitely known that Eberth's bacillus could produce a suppurative inflammation. In that year A.

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* The hospital at this time was much overcrowded. Beside the usual run of cases, there were, coincidently, seventy-eight cases of typhoid fever. This service naturally entailed, both on myself, Dr. Ghriskey, and the residents, an excessive amount of routine work, and more than could be adequately well done.

† Read at the first annual meeting of the American Association of Pathologists and Bacteriologists, Boston, 1901.

Fraenkel[3] obtained this micro-organism in pure culture from an encapsulated peritoneal abscess.

The original demonstration of the occurrence of the typhoid bacillus in suppurative cholecystitis was made by Gilbert and Girode[4] in 1890.

Louis,[5] writing in 1829, said that changes in the bile and gall-bladder are much more frequent in the course of typhoid fever than in any other acute disease. Quincke,[6] in his recent article in Nothnagel's *System*, bears witness to the truth of this statement.

In health the bile* is sterile; but the old idea that it possessed marked antiseptic properties has been overthrown. Fraenkel and Krause,[9] Miyaki,[8] and others have shown experimentally that the bacillus typhosus and the bacillus coli grow luxuriantly in normal bile.

The gall-bladder is a favorite habitat of the typhoid bacillus. During the past four years at the Boston City Hospital we have made cultures from the gall-bladder in thirty autopsies upon cases of typhoid fever. In twenty-one the bacillus typhosus was obtained. In one of these cases there was a catarrhal cholecystitis; in all the others the gall-bladder and bile appeared normal. In five of the nine negative cases the bacillus typhosus was not found in any of the organs. Chiari[10] found the typhoid bacillus in the gall-bladder of nineteen out of twenty-two patients who died of typhoid fever. Osler[1] states that Flexner found this micro-organism in the bile in seven out of fourteen cases. There was no clinical or pathological evidence of cholecystitis in any case in his series.

As the gall-bladder in typhoid fever usually contains the typhoid bacillus, and as inflammation of the gall-bladder is relatively rare, some factor other than the presence of the typhoid bacillus must be necessary to produce cholecystitis.

The typhoid bacillus may remain in the gall-bladder after it has disappeared from the other organs. In two cases I found it in the gall-bladder, while cultures from the heart's blood, spleen, liver, and kidney were negative. Welch[11] and Blachstein, in their experimental studies, found that the typhoid bacillus remained in the gall-bladder of rabbits after it had disappeared from every other organ. In one case it was found one hundred and twenty-eight days after intravenous inoculation. Miller[12] has reported a case of cholecystitis in which the bacillus typhosus was isolated seven years after an attack of enteric fever, and v. Dungern[13] obtained the micro-organism fourteen years, and Droba[14] seventeen years subsequent to the primary infection.

Stagnation of the bile favors bacterial invasion. Netter,[15] Homén,[16] and Miyaki[8] found that after ligating the ductus choledochus the gall-bladder was soon infected. Netter demonstrated that such an infection could occur within twenty-four hours. Recently at the Boston City Hospital an exploratory laparotomy was made in a case of suspected cholecystitis. A nodular mass involving the head of the pancreas was discovered. The gall-bladder and the bile appeared natural; but the bile yielded an abundant growth of the bacillus coli, and this micro-organism was also demonstrable in cover-slips made from the bile. In this instance it is probable that infection followed slight compression of the ductus choledochus by the new growth. Petersen,[17] in his report of the cases of cholelithiasis occurring in Czerny's clinic, says: "The bile which escaped from the fistulous opening was examined from time to time, and it was found that the bacteria diminished very rapidly. The bile often became sterile at the end of eight days, and almost always after three or four weeks." Cushing[18] found in one experiment that typhoid bacilli introduced directly into the gall-bladder of a dog entirely disappeared from the bile in twenty-four hours. These observations seem to show the importance of an unimpeded outflow from the gall-bladder.

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* Ehret and Stolz[7] during the past year have attempted to prove that the bile of healthy animals, in the majority of cases, is not sterile, but contains bacteria in small numbers. Their work is not convincing, and Miyaki has been unable to confirm their results.

Channels of Infection. Bacteria possibly infect the bile in two ways: 1. An ascending infection through the biliary passages from the duodenum. 2. A hæmatogenous infection. Bacteria enter the portal circulation from the diseased portion of the intestine, and are eliminated by the liver and pass into the bile.

In typhoid fever the evidence seems to point to infection through the blood. The typhoid bacillus is nearly always found in pure culture in the gall-bladder. In the eleven positive cases of which I have the full bacteriological notes it was obtained in pure culture in every instance. If infection took place through the biliary passages we should expect to have a mixed infection with the bacillus coli or the streptococcus, as Miyaki has shown that these bacteria, at least in animals, are generally present in the lower end of the ductus choledochus.

Fütterer[19] has demonstrated that micro-organisms which enter the portal vein begin to be excreted by the liver through the biliary channels within a few minutes. It would seem as if the specific bacillus must gain entrance into the circulation in every case of enteric fever, as Neufeld[20] has called attention to the association of the typhoid bacillus with rose spots, and his observations have been confirmed by Curschmann,[21] Rumpf,[22] Scholz and Krause,[23] in Germany, and in America by Richardson[24] and workers in our own laboratory.

Typhoid septicæmia is no longer regarded as an extremely rare condition. Auerbach and Unger[25] have obtained the bacillus typhosus from the blood during life in seven out of ten cases, and Schottmüller[26] in forty out of fifty cases.

We have cultivated the bacillus typhosus at the autopsy from the heart's blood during the past two years in three out of twelve cases. I obtained the micro-organism in one case from the heart's blood, the spleen, the liver, the kidney, a mesenteric lymph node, the gall-bladder, the urinary bladder, the right middle ear, and the bone-marrow.

If we regard every case of invasion of the gall-bladder by the typhoid bacillus, without symptoms and without pathological changes, as a case of cholecystitis, then, as we have shown, nearly every case of typhoid is a case of cholecystitis. This is confusing and unreasonable. We should limit the term cholecystitis to those cases in which there is clinical or pathological evidence of inflammation of the gall-bladder.

Origin of Gallstones. The theory advanced by Naunyn,[27] in 1891, that gallstones are due to a catarrhal inflammation of the gall-bladder induced by micro-organisms, has been generally adopted. It is supported by experimental and bacteriological evidence. Among recent investigators Chauffard[28] appears as the sole supporter of the old theory of a lithiac diathesis.

According to Cushing,[29] Dr. Welch, in 1890, obtained living colon bacilli from the centres of gallstones, and suggested that they might bear an etiological relation to the formation of biliary concretions.

Fraenkel and Krause,[9] and v. Mieczkowski[30] have shown that the gall-bladder in general disease conditions rarely contains micro-organisms.* Yet in cholelithiasis it is almost always infected. Petersen[17] found bacteria present in the gall-bladder in thirty-six out of forty cases and v. Mieczkowski[30] in eighteen out of twenty-three. In all of the infected cases the bacillus coli was isolated, usually in pure culture. Other observations tend to show that the bacillus coli is the micro-organism most frequently associated with biliary lithiasis.

Dufourt[32] refers to nineteen patients with gallstones whose first attack followed typhoid fever, in twelve cases within six months.

Cushing[29] reviewed the cases of cholecystitis associated with gallstones, operated on at the Johns Hopkins Hospital, and found that ten out of thirty-one gave a previous history of typhoid fever.

Richardson[33] observed large clumps of typhoid bacilli in the bile, suggesting a gigantic Widal reaction in the gall-bladder. He put forward the theory that these clumps of agglutinated bacteria serve as the starting-point for the formation of biliary calculi.

Experimental researches support the view that the typhoid bacillus induces gallstone formation. Gilbert and Fournier[34] produced biliary calculi in animals by the injection into the gall-bladders of attenuated cultures of the typhoid bacillus. Richardson[35] produced a stone about

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* The earlier and widely quoted observations of Létienne[31] seemed to show that in disease the bile was usually infected. He found the bile sterile in only eighteen out of forty-two cases examined. Létienne's work is justly criticised by Fraenkel and Krause. His methods were faulty, and his results are not in accord with those of more careful investigators.

7 mm. in diameter by injecting a culture of agglutinated bacilli into the gall-bladder of a rabbit. Cushing[18] was successful in one case in producing small biliary calculi by an intravenous inoculation of the bacillus typhosus.

Mignon[36] believes that the formation of stones ceases with the death of the bacteria. Old stones are sterile.

The cases of cholecystitis caused by the bacillus typhosus can be divided into two classes: 1. Cholecystitis secondary to typhoid enteritis. 2. Cholecystitis due to a primary infection of the gall-bladder. Since Dr. Mason[2] published his report, in 1897, five cases of cholecystitis due to the typhoid bacillus have been studied at the Boston City Hospital. Three of these occurred during typhoid fever.

CASE I. *Catarrhal cholecystitis during typhoid fever; death from intestinal hemorrhage; bacillus typhosus in pure culture from the gall-bladder.*—Henry R., aged twenty-eight years (autopsy No. 9973), died May 8, 1899, of intestinal hemorrhage in the fifth week of typhoid fever. There were no symptoms referable to the gall-bladder. At the autopsy the classical intestinal lesions of typhoid fever were found. The bile appeared natural except for the presence of great numbers of minute shreds. Microscopical examination of the bile revealed large masses of desquamated epithelium and great clumps of bacilli morphologically identical with the bacillus typhosus. The appearance of the clumps was similar to that seen in a Widal reaction except that they were much larger.

Bacteriological Examination. A bacillus varying in length, decolorized by Gram's method, no gas production in a Smith fermentation tube containing 1 per cent. glucose bouillon, motile in twenty-four-hour bouillon cultures. The micro-organisms were agglutinated by the blood of a typhoid patient, diluted 1 : 30. Blood was collected at the autopsy, sealed in a glass tube and tested seven days later. It agglutinated the bacillus obtained from the gall-bladder in dilutions of 1 : 100 and 1 : 200; no reaction, 1 : 500. It agglutinated a culture of the stock typhoid bacillus in the same dilutions. Diagnosis: bacillus typhosus.

CASE II. *Cholecystitis during typhoid fever; cholecystostomy; bacillus typhosus in pure culture; death.*—Emaria E., aged fifteen years, admitted to Dr. Shattuck's service, September 2, 1899. Three weeks before entrance taken with fever and pain in abdomen. Diarrhœa since onset. Young lad, fairly well developed and nourished. Spleen palpable, abdomen rigid, tympanitic; rose spots over lower chest and upper abdomen. Two days after admission general abdominal tenderness, muscular spasm, slight distention. Pulse rose from 110 to 160; temperature, 104°; leucocytes, 5200; Widal negative. A perforation was suspected.

Operation, by Dr. Munro, September 4th. In peritoneal cavity some light coffee-colored serum; no signs of perforation. As urine drawn during the operation contained bile, an incision was made through the right rectus muscle and the gall-bladder opened. Dark bile and some puriform material escaped. The patient died the following day; no autopsy.

Bacteriological Examination. A cover-slip preparation made at the operation from the contents of the gall-bladder showed medium-sized bacilli decolorizing by Gram's method. In the cultures a pure growth of this bacillus was obtained. It had the following characteristics: No gas in glucose agar; acidified milk very slowly; did not coagulate milk; no indol produced in four days in glucose-free bouillon; agglutinated by the blood of a typhoid fever patient. Diagnosis: bacillus typhosus.

CASE III. *Suppurative cholecystitis during the third week of typhoid fever; cholecystostomy; small biliary calculi found; bacillus typhosus isolated in pure culture from gallstones and bile; recovery.*—Annie D., aged thirty-six years, admitted to Dr. Shattuck's service October 20, 1899, complaining of headache. Patient's health had always been good; she remembered no previous illness. On October 13th, seven days before admission, seized with severe headache, so took to bed. Chills at onset; diarrhœa; anorexia. She was a well-developed, obese woman. Temperature on admission 102.8°; general abdominal tenderness. Case progressed favorably until October 30th, when there was a sudden onset of severe pain in the epigastrium and the right hypochondrium; no distinct chill, but acknowledged shivering a little; no vomiting; no jaundice. Palpation revealed, about a hand-breadth below the right costal margin, the outlines of an apparently enlarged gall-bladder. The temperature, which had been slowly but steadily falling since admission, shot up to 103.1° that evening; pulse rapid; face flushed. Leucocytes, 13,200. October 31st, patient seen by Dr. Munro, who diagnosed probable suppurative cholecystitis, and advised operation.

Operation, by Dr. Munro. Vertical incision over tumor. Gall-bladder tense, swollen; fresh adhesions bind it to intestines and omentum. Gall-bladder opened; bile and creamy pus escaped, with a number of small gallstones. Patient made a good recovery. Left the hospital December 11th; small granulating wound; no discharge of bile.

Bacteriological Examination. Seven small spherical gallstones 1 to 3 mm. in diameter; surface dark, brownish-gray, crenated. They are friable; centres yellowish. The stones were split with a sterile knife and cultures made from their centres.

A serum culture inoculated with pus from the gall-bladder and agar plates from the nuclei of two gallstones gave pure cultures of the typhoid bacillus. Growths from six different colonies each showed: a bacillus decolorizing by Gram's method; motile in twenty-four-hour bouillon cultures; straw-colored growths on serum; invisible growth on potato; milk not coagulated; no gas in glucose agar; no indol in glucose-free bouillon. Agglutinated by blood of a typhoid patient in fifteen minutes; dilution, 1:25; diagnosis: bacillus typhosus.

In this case there can be but little doubt that the typhoid bacillus was the cause of the cholelithiasis. If so, it would seem as if the calculi must have been formed within eighteen days, and it is probable that they were formed in much less time. This is in accord with the view of Naunyn,[37] who believes that biliary concretions can be formed in a very short time. Milian[38] found gallstones which contained the typhoid bacillus in a patient who died on the sixteenth day of typhoid fever, and Hanot[39] in a patient who died near the end of the third week.

CASE IV. *No history of typhoid fever; cholelithiasis; cholecystostomy; bacillus typhosus obtained in pure culture from gall-bladder and from gallstones; death.*—Mary L., aged forty-three years, admitted to Dr. Monk's service, September 27, 1900, complaining of pain in the abdomen. Two similar attacks—one seven, the other six years ago—each lasting about two weeks; never jaundiced; no history of typhoid or other continued fever. Three weeks before admission, while at sea, severe attack of nausea, vomiting, and general malaise; no nose-bleed; no diarrhœa. Condition at this time was thought to be due to sea-sickness. After several days got well of this illness. Four days before admission, onset of severe abdominal pain referred mainly to epigastrium and right hypochondrium. No jaundice, no nausea or vomiting. Several severe chills, moderate fever. Patient was well developed, obese; temperature 100°. No abdominal distention; slight involuntary spasm in right upper quadrant of abdomen; over this area relative dulness and moderate sense of resistance; slight pain on palpation of upper abdomen. Leucocytes, 5000. During next three days temperature showed wide variations; occasional chill.

Operation, by Dr. Monks, September 30th. Incision 12 cm. long in right hypochondrium, parallel to and over outer edge of right rectus. Abdominal wall very thick. Gall-bladder just beneath anterior margin of liver, presenting end 7.5 cm. in diameter, the whole surrounded by many adhesions. The gall-bladder was incised; the wall measured 3 to 4 mm. in thickness; much pus without odor escaped; 218 gallstones removed. The cystic and common bile ducts explored and no gallstones discovered.

The patient failed steadily, and died October 19th. . No autopsy.

Bacteriological Examination. A cover-slip preparation from the gall-bladder showed polynuclear leucocytes and a few short bacilli which were decolorized by Gram's method. Culture upon blood serum: Diffuse, moist, white growth of a short bacillus, decolorized by Gram, present in pure culture. It had the following characteristics: distinctly motile; bouillon diffusely clouded; brownish-white elevated colonies on agar-agar and blood serum; invisible growth on potato; litmus milk rendered acid, not coagulated; no indol in glucose-free bouillon. No gas production in 1 per cent. glucose bouillon after five days, terminal reaction of bulb of Smith fermentation tube acid; no gas in 1 per cent. lactose bouillon, reaction alkaline; no gas in 1 per cent. saccharose bouillon, reaction alkaline. Diagnosis: bacillus typhosus.

The gallstones varied in size from 3.5 mm. to 1 cm.; pyramidal shaped; brownish-yellow, mottled; central portion dark-brown, surrounded by grayish-white outer layer marked with radiating striæ. All the calculi similar in color, shape, and consistence. No cultures were made from the calculi at the time of the operation. I did not get possession of them until January 2d. Although they had been kept in a hot, dry room for three months, I made cultures on that day from the centres of ten of the gallstones. Cultures from eight of the stones remained sterile. From the other two—one measuring 6 mm. the other 7 mm. in size—I obtained a meagre but pure growth of a bacillus with the following characteristics: decolorized by Gram; gelatin not liquefied; invisible growth on potato; no indol produced in glucose-free bouillon; milk acidified, not coagulated; no gas produced in 1 per cent. saccharose, in 1 per cent glucose, or in 1 per cent. lactose;

agglutinated by blood of a typhoid patient, dilution 1:100. Culture of our stock typhoid bacillus agglutinated by same blood, dilution 1:100; not agglutinated in a dilution of 1:200. Diagnosis: bacillus typhosus.

The history in this case dates back seven years, so it is probable that the gall-bladder harbored the bacillus typhosus for that length of time. It is interesting to note that the biliary calculi contained living typhoid bacilli three months after their removal from the patient. Another interpretation of the findings is that the patient had a mild attack of typhoid fever a month before admission; that the gall-bladder was secondarily involved, and that the typhoid bacilli penetrated sterile gallstones. The theory that bacteria enter pre-formed pigmented gallstones is not supported by an observation lately made by Dr. Christian at the Boston City Hospital. He obtained an abundant pure growth of the bacillus mucosus capsulatus from a case of suppurative cholecystitis associated with cholelithiasis, but the gallstones were sterile.

CASE V. *No history of typhoid fever; gangrenous cholecystitis and localized peritonitis caused by the bacillus typhosus; cholecystostomy; partial cholecystectomy; recovery.*—Kate B., aged thirty-six years, admitted to Dr. Gavin's service May 16, 1900. No history of typhoid fever. Sixteen days before entrance pain in back, chill, vomiting; took to bed and remained there; bowels regular, pain worse in legs. Three days before admission onset of pain in right hypochondrium; vomiting of greenish material; noticed lump in side three weeks earlier. Patient was well developed and fairly well nourished. Temperature, 102°. Abdomen moderately distended; tumor mass in right upper quadrant; flat on percussion; tender; muscle spasm. Left leg swollen, hard, reddened, from knee to ankle.

Operation, by Dr. Gavin, May 17th. Vertical incision in right hypochondrium. Gall-bladder greatly enlarged and covered with flakes of fibrin. On incising the organ a large amount of greenish-yellow pus escaped. A portion of the wall of the gall-bladder was removed, as it was apparently gangrenous. Temperature fell gradually after the operation. Patient made a good recovery.

Bacteriological Examination. Cover-slip from external surface of gall-bladder showed an occasional polynuclear leucocyte; rather numerous bacilli. Culture on blood serum after twenty-four hours showed a diffuse, grayish-white growth of a medium-sized bacillus decolorizing by Gram. A similar bacillus was obtained in pure culture from the contents of the gall-bladder. Both had the following properties: Actively motile in twenty-four-hour bouillon cultures; milk not coagulated; no indol production; no gas produced in fermentation tubes containing glucose, saccharose, and lactose bouillon. Agglutinated by typhoid blood, dilution 1:10; no reaction, 1:25. Agglutinated by patient's blood, 1:10; no reaction, 1:25. Known typhoid bacillus agglutinated by patient's own blood, 1:10; no reaction, 1:25.

As there were no symptoms or history of typhoid fever in this case, it is probably another instance of primary infection of the gall-bladder with the bacillus typhosus. In 1898, Cushing[39] reported a case similar to these two, and Mitchell[40] has recently recorded another. Hunner[41] studied a case of cholecystitis in which he considered the bacillus typhosus had been retained within the body since an attack of typhoid eighteen years before. This is possible, but, as Horton-Smith[42] says, the evidence in Hunner's case seems to point to a local infection. If it be included we have, with the two here reported, five cases of primary infection of the gall-bladder with the bacillus typhosus.

I wish to express my indebtedness to the visiting surgeons of the Boston City Hospital for permission to publish the clinical histories of the cases here reported, and to the assistants in the pathological laboratory for aid in the bacteriological work.

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THE OPERATIVE TREATMENT OF PARALYTIC TALIPES OF THE CALCANEUS TYPE.[1]

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PARALYTIC talipes calcaneus is, as the name implies, that form of talipes characterized by a prominent heel. It is, however, far more important as a disability than as a deformity, for its cause is the loss of the principal lifting and propelling force of the body—the calf muscle. When this muscle is paralyzed the os calcis, deprived of its support, sinks downward and assumes by degrees a more or less vertical position, its posterior surface becoming inferior. Thus the distance between the ankle-joint and the bearing surface of the heel is increased. There is not, however, except in advanced cases, persistent dorsal flexion of the foot, as is sometimes seen in the congenital form, because this attitude is opposed by the force of gravity.

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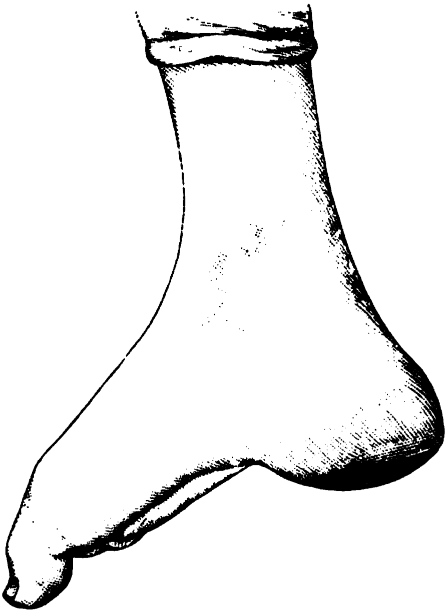
[1] Read before the American Orthopedic Association, 1901.

The most noticeable of the secondary deformities is the exaggeration of the longitudinal arch. This is caused by the approximation of the anterior and posterior supports of the foot, by the action and retraction of the remaining muscles, and by the adaptive shortening of the other tissues. These secondary changes are in great degree the effect of functional use, and are, therefore, most marked when the foot has been used for a long time without adequate mechanical protection. (Fig. 1.)

FIG. 1.



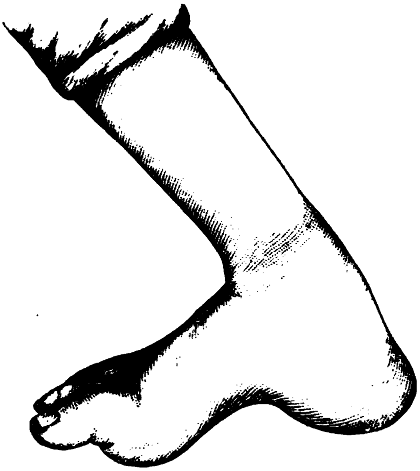
Talipes calcaneus due to paralysis of the calf muscle (gastrocnemius and soleus), illustrating the typical deformity of moderate degree.

In cases of this character, with which this paper is chiefly concerned, the patient, to all intents hamstrung, stamps about on his heel very much as one would after a Pirogoff amputation, but with the added disadvantage of the insecurity due to the uncontrolled movement at the ankle-joint. The forefoot serves no function other than to fill the shoe, and in advanced cases it becomes simply an atrophied appendage suspended from the elongated and pad-like heel.

In anterior poliomyelitis the affection, which in all but very exceptional cases is the cause of the deformity under consideration, the paralysis is by no means always limited to the calf muscle; in many instances the adductors or abductors are involved, with consequent lateral distortion. Of this type calcaneo-valgus is the most common and the most important. (Fig. 2.)

If the calf muscle alone is paralyzed, the damage to the spinal cord being limited in area, the growth of the limb is not particularly affected, nor is the circulation greatly impaired. And, although the power of the other muscles of the posterior group is of little value as far as function is concerned, the foot remains far more normal in contour and life-like in appearance than when the paralysis is more extensive. In almost every instance, however, the growth of the foot is retarded, far more so than when the muscles of the anterior group are paralyzed. This is a striking example of the effect of loss of function on development.

FIG. 2.



Talipes calcaneo-valgus. In this form the adductors of the foot (tibialis anticus and posticus) as well as the calf muscle are paralyzed.

As has been stated, deformity is favored and induced by functional use, and, while it may be admitted that efficient protection would in great degree prevent the secondary and characteristic distortions, yet the general results of mechanical treatment, judged from actual observation, are very unsatisfactory.

The reason is apparent. When the anterior muscles are paralyzed the function of the brace is simply to prevent toe-drop, but when the power of the calf muscle is lost the support must withstand the weight of the body and the strain of locomotion. Under this strain the springs and elastic bands, so often employed with the aim of replacing muscular action, give way, and even braces of more solid construction bend and break with discouraging frequency.

The expense of apparatus and the constant need of repairs account doubtless for the fact that, in the majority of cases, braces are inefficient, or are worn intermittently, or are discarded altogether; consequently the deformity develops, often to an extreme degree. This is especially true of the cases of calcaneo-valgus because of the difficulty of controlling the lateral deformity and because of the discomfort often caused by the restraining support.

It is in cases of this type that one turns to operative treatment in the hope of palliating the disability, of restoring the symmetry of the foot, or, at least, of making support less burdensome and more effective.

In the consideration of this form of treatment tenotomies, forcible correction and the like, which are undertaken simply to overcome secondary deformity, do not require comment. The other procedures which are at the present time advocated are Willett's operation and its modifications, tendon transplantation, and arthrodesis. These may be considered in order.

WILLETT'S OPERATION consists essentially in dividing and shortening the tendo Achillis, together with the overlying fascia and skin on the back of the ankle, sufficiently to hold the foot at a right angle with the leg, or, as modified by Gibney, in an attitude of plantar reflexion as extreme as is practicable. The object of this operation is to oppose the resistance of the non-contractile tissues on the back of the leg to the deforming influence of functional use. Further experience has shown that except in those cases in which contractile power remains in the calf muscle the procedure, even from the palliative stand-point, is of little service other than as a means of restoring temporarily the symmetry of the foot. Furthermore, when the foot is inclined toward varus or valgus the operation is contraindicated, as the shortened tissues on the posterior aspect of the limb would tend to exaggerate the lateral deformity.

The operation of sawing off the posterior extremity of the os calcis and displacing it further downward, as suggested by Walsham, is simply another method of shortening the tendo Achillis, which has little to recommend it.

TENDON TRANSPLANTATION. It is interesting to note that the first operation of tendon transplantation was performed by Nicoladoni for the relief of this deformity, the two lateral peroneii being inserted into the tendo Achillis. Yet this is the condition of all others for which the procedure, from a curative stand-point, is of least value. The calf muscle is nearly double the strength of all the other muscles of the foot combined, and more than ten times as strong as the two muscles which were used to replace it.

It is evident, then, that tendon transplantation finds its proper place as a palliative operation which may be of advantage when one can change a force that distorts the foot to a position in which it may be of service even if slight.

ARTHRODESIS. This operation is performed with the aim of establishing a firm right angular ankylosis at the ankle-joint, thus allowing the patient to dispense with apparatus.

Arthrodesis at the ankle-joint is of little value when lateral distortion is present. In such cases the operation must include the sub-astragaloid and medio-tarsal joints also. In any event arthrodesis is likely to be disappointing if performed in childhood, as growing bone can hardly restrain so marked a tendency toward deformity. If, then, apparatus must be employed in the after-treatment, absolute fixation is undesirable because of the increase of the muscular atrophy that is likely to follow and because a certain elasticity at this joint lessens the strain upon it.

This sketch of the operative treatment presents fairly, I think, the inadequacy of each of the procedures that are recommended for the relief of this affection. Indeed, an analysis of the disability should make this evident without the test of actual experience. As has been stated, the disability of calcaneus depends in very great degree upon the insecurity of the foot. This insecurity, although caused directly by the paralysis, is greatly exaggerated by the fact that the weight must be supported on the astragalus perched upon the displaced os calcis, and the in stability is, of course, increased when there is lateral distortion of the foot.

The most effective remedy, therefore, must be removal of the astragalus. Sufficient mobility is thus gained to allow of a backward displacement of the foot upon the leg, so that the body-weight, instead of falling upon an elongated heel practically in the plane of the flattened calf, is advanced toward the centre of the foot. Thus the adverse leverage which tends toward recurrence of deformity is lessened, and the symmetry of the distorted part in great degree is restored. Incidentally one or all of the procedures that have been described may be indicated as a subsidiary part of the treatment. In fact, the operation that I have usually performed for the relief of calcaneo-valgus might be described as astragalectomy, arthrodesis, tendon shortening, tendon transplantation, and backward displacement of the foot, the first and last of these being by far the most important, in that the chief cause of the insecurity is removed by lowering and carrying forward the articulation between the leg and the foot.

The details of the operation are in brief as follows: A long curved incision is made below the external malleolus from the tendo Achillis behind to the head of the astragalus in front. The two peroneii tendons are freed and are either divided or displaced backward; the astragalus is then exposed and its extraction is usually made comparatively easy after the interosseous ligament has been divided by forcibly displacing the foot inward. The cartilage is then removed from the surfaces of all the adjacent bones; the tendo Achillis is shortened if it is longer than the new position of the foot will require, and into it are inserted and attached the proximal ends of the tendons of the two peroneii muscles, which in cases of calcaneo-valgus usually retain their power—a power that serves no useful purpose, but is simply an agent of deformity. The wound is then closed and the foot is displaced backward so that the internal malleolus is brought into contact with the

FIG. 3.

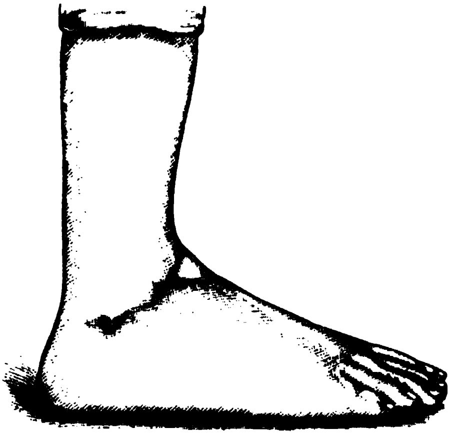
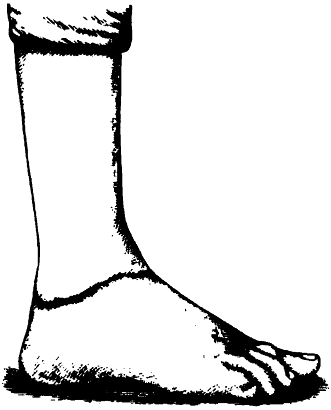


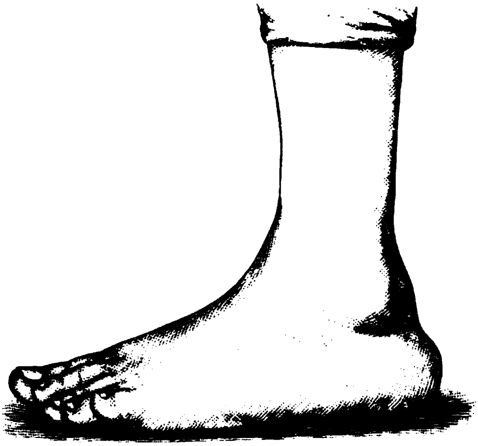
FIG. 4.



scaphoid bone, and a plaster bandage is applied, fixing the foot in an attitude of slight plantar flexion. (Figs. 3, 4, and 5.)

The operation may be most conveniently performed under the Esmarch bandage, the pressure being finally relaxed, so that bleeding points in the skin may be secured. Subsequently the limb is elevated for a time to lessen the oozing from the denuded bones. Drainage is unnecessary. The plaster bandage remains until the parts are firmly healed, the patient being encouraged to use the foot as soon as pressure causes no discomfort, usually in from one to three weeks after the operation. In none of the operations, thirteen in number, that I have performed has there been wound infection, and the only mishap was a superficial sloughing of the skin due to a tight bandage. This, however, in no way interfered with the success of the operation.

FIG. 5.

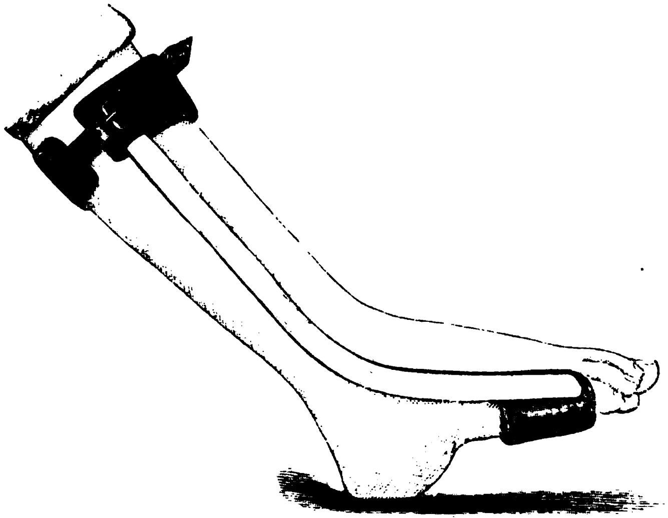


Figs. 3, 4, and 5 illustrate the effect of operative treatment in cases of paralytic talipes calcaneo-valgus.

Although the cartilage is removed from the bones, one must not expect absolute ankylosis, as the apposition of the parts is not sufficiently perfect to assure it. In fact, as has been stated, the limited motion that remains is desirable, especially in those cases in which considerable muscular power remains, as it lessens the direct strain upon the ankle. Apparatus to prevent deformity has been employed in all cases, although the patients can walk without it very well, and it may be that in time it can be discarded.

Recently I have employed a support which seems to be a great improvement over those that I formerly used. A plaster cast of the foot and leg is made with the part in the proper attitude, and on this the brace is modelled. It consists essentially of two light curved steel bars passing from the middle of the lateral aspect of the upper quarter of the leg downward on either side, in front of or over the malleoli to the metatarso-phalangeal joints. These bars are attached to one another below by a curved foot-plate as wide as the bearing surface of the anterior part of the foot, and above by another steel band of similar width which passes across the front of the leg in the neighborhood of the tubercle of the tibia. This is suitably padded, the circumference at this point being completed by a strap about the calf. An elevation of cork or rubber is placed in the back of the shoe to support the foot in the attitude of slight plantar flexion, corresponding to the cast. A similar thickening of the heel of the shoe, sufficient to induce very slight flexion at the knee, is of advantage also in counteracting the tendency to recurvation, which is present in certain cases. It also serves to lengthen the limb, which is usually somewhat shorter than its fellow. This brace, which is held firmly in its place by the shoe, is inconspicuous, simple in construction, and much more resistant than the ordinary brace, as the strain upon it is comparatively slight. There is consequently no likelihood of slackened straps, or of distorted uprights, or of broken foot-plates. Its use is, of course, not limited to operative cases; but as this paper is especially concerned with this class I need not consider further details of mechanical treatment, except to call attention to the fact that the gait of the wearer of a wooden leg for an amputation below the knee is far better than in the majority of cases in which the essential muscles that control the foot are paralyzed. The greater,

FIG. 6.



An effective brace for talipes calcaneus.

therefore, the approximation to the security assured by the artificial member, the greater will be the improvement in locomotion. This is a fact not generally recognized in the construction of the ordinary brace.

It is not my purpose to urge operative treatment for all cases of calcaneus, but simply to suggest an effective procedure for those cases in which, for one reason or another, mechanical treatment is inefficient —a class which, in hospital practice at least, is a very large one.

THE DIFFICULTIES IN MAKING A DIAGNOSIS IN THE BONE LESIONS OF NURSLINGS.[1]

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THE title of this paper suggested itself to me on account of the paucity of symptoms presented by several cases in babies in my wards during the past year which rendered an early and definite diagnosis most difficult and unsatisfactory. I present it in the hope that the discussion which it may bring forth from my fellow-members, together with observations I myself may make, will add somewhat to our means of making a more definite and an earlier diagnosis.

By nurslings I have meant to convey those babies under two years of age who are either breast-fed or bottle-fed, and in whom dentition has not begun or is only partially completed. However, the limitation need not be made, as many of the symptoms and blood changes to be spoken of occur in young children as well as infants.

On being called to see a baby with one or more of the cardinal symptoms of bone inflammation certain of the following formidable array of diseases may present themselves to the clinician for differentiation and exclusion, viz.: tuberculous osteomyelitis or epiphysitis, syphilitic periostitis and osteochondritis, achondroplasia, rhachitic proliferation, softening or eburnation, scorbutic subperiosteal hemorrhage, or, perhaps, epiphyseal separation, osteosarcoma, epithelioma (?), rheumatism, "growing pains," rheumatoid arthritis, acute anterior poliomyelitis, acute osetomyelitis, acute arthritis, and also influenza, typhoid infection, colon infection, and pneumococcus infections; osteomata, whether exostoses or hyperostoses; osteopsathyrosis, spontaneous fractures, and cysts.

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[1] Read before the American Orthopedic Association, 1901.

The following is a case in point, involving a differential diagnosis between tuberculous osteomyelitis, specific osteochondritis, the subperiosteal hemorrhage of scurvy, and sarcoma:

CASE I.—C. C., a boy, aged five months, was put under my care on January 1st of this year. The child seemed in great pain in the right leg, which was held flexed at about 45 degrees, rotated outward, and abducted the same amount. The mother stated that the child had had pain apparently for three months—*i. e.*, from the time he was two months old—and she noticed he had held his leg constantly still and moved the left leg freely, so that she thought the right leg must be paralyzed.

Family History. The parents were refined and well-to-do, apparently healthy people. They had been married ten years before any children were born to them, but any miscarriages were denied. The father had led a rough life on the plains, and had been more or less dissipated. He acknowledged drinking to excess, had had venereal warts, but denied syphilis. He had had no rash, sore-throat, or headache, etc., at the time of the appearance of the venereal warts, and had received no medication for a prolonged time. (Further data on this point was unobtainable.) He is subject to "rheumatic gout." The patient has a brother and sister who are said to have always been strong and well. A paternal uncle died of phthisis, and a maternal uncle had a sinus in the back. The first wife of the patient's father died of consumption eleven months after marriage. Any history of malignant tumor in the family is lacking.

Previous History. The labor was easy and normal, and the child at birth was large and apparently healthy. No definite history of "snuffles" or rash is obtainable; but the baby had, when one month old, a large red, ecchymotic spot on the left cheek, which shortly disappeared. When two months old a swelling appeared at the left wrist, with malposition of the hand, which the mother thinks involved the joint. This was treated by the family physician with pasteboard splints and mercurial ointment, and followed by recovery; but some thickening is still easily detected at the lower left radial epiphysis. The feeding had been combined bottle-feeding and nursing. At the time of admission the child nursed twice daily, and was bottle-fed on equal parts of milk and water, *sterilized*, every three hours.

Pain and night-cries had been present for two months before I saw the patient, and insomnia has been a marked symptom. The maximum temperature, reached a few days before admission, was 103° F., but did not exceed 100° F. after that. As to any history of trauma, the father thought a former nurse was of such a nature that she would have unhesitatingly struck the child or wrenched an arm or a leg in anger, and attributed the child's condition to this; but he had no definite knowledge to this effect.

Condition of child on admission to the hospital, January 8th: On inspection a plump, well-nourished and well-muscled baby, and large for its age, was seen, weighing eighteen pounds two ounces. The lips, mucous membranes, cheeks, and nails were of a good color. The skin everywhere seemed normal, with no scars or discolorations suggestive of ecchymoses or subcutaneous hemorrhages. The gums were normal in appearance, and no teeth showed signs of erupting. The head was of good shape, with fontanelles open, but not protuberant. Chest and abdomen were normal in shape, and there was no beading of ribs or enlargement of epiphyses except as above stated (viz., left radius). The eye at once noticed the malposition of the right thigh and a distinct, fusiform, diffuse, spindle-shaped swelling at the upper third of the thigh, measuring 10⅞ inches (28 cm.) in circumference against 10 inches (25.5 cm.) on the left. This swelling was said to have increased rapidly of late.

On palpation the lymphatic glands were not appreciably indurated anywhere except in the right inguinal region and right iliac fossa. The spleen was palpable, and extended 2 cm. below the costal margin. Percussion also disclosed this Auscultation was negative except for a slight bronchitis involving the larger tubes.

The swelling in the right femur seemed to extend from about the middle third of the thigh to a point near the coxo-femoral articulation, but not into it. It was larger above than below, hard, did not fluctuate, and involved apparently more the anterior and external aspect than the posterior and internal. Muscular spasm was marked, and any movement seemed to cause pain and brought on a crying spell. The other joints did not show this tenderness. One point on the external aspect seemed to be more sensitive than the rest. A radiograph was made, which showed an hour-glass shape in the bone, with straight, regular edges. The blood count gave: Reds, 4,100,000; whites, 18,400; hæmoglobin, 80. The differential count showed lymphocytes increased; no myelocytes or eosinophiles. Beginning poikilocytosis was noted. The diagnosis, so far as the blood was concerned, showed a slight secondary anæmia.

With this data before me I at first thought of two possibilities—scurvy and tuberculous osteomyelitis. For the former I gave modified Pasteurized milk, lemon-juice, and beef-juice; and for the latter employed traction in the line of the deformity of 1¾ to 2½ pounds, which seemed to afford almost immediate relief. On the third or fourth day after the traction was instituted the baby seemed perfectly comfortable, slept all night, appetite became vigorous, and increased weight was shown. I reluctantly gave the child for three successive nights tuberculin from Trudeau's laboratory, the most reliable I could get, with absolutely negative results. I say "reluctantly," because I felt if the result had been positive a bronchial lymph node might be responsible, and not the thigh trouble; and, beside, the usual site for tuberculous invasion—the epiphysis—did not seem the location of the trouble. If negative, we all know tuberculin is not infallible, and a wrong inference might be obtained. The picture was not that of a true tuberculous coxalgia, and the child's age and the rapidly increasing induration was against such a diagnosis. The blood-findings, according to Dana's forty-one published observations,[1] led me to think the high leucocyte count would indicate tuberculous abscess formation; but Brown,[2] after an examination of seventy-two cases, dissents from this conclusion unless there is a secondary infection; "simply increased activity of the tubercular process itself," he claims, "would not give an increased leucocyte count over 2000 to 3000 above normal." Thus my diagnosis of tuberculous osteomyelitis was most unsatisfactory and by no means conclusive.

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[1] Boston Med. and Surg. Journ., May 28, 1896.

[2] Transactions of California Medical Society, 1897.

My diagnosis of scorbutus also lacked many usual symptoms to sustain it. The gums were normal, no subcutaneous hemorrhages had appeared, and there was no anæmia to speak of. The child was well nourished, and the other limbs showed no tenderness. The only possible straws for the scurvy theory to hold to were the possible subperiosteal hemorrhages and the fact that many of the best authorities, such as Starr, Rotch, Lewis Smith, H. L. Taylor, and others, observe that scurvy shows no bleeding gums prior to dentition. Aspiration brought out only a few drops of blood, which was normal in appearance and not black or disintegrated. Thus following the old whist rule, "when in doubt, lead trumps," I ordered mercurial inunctions. After one week of this treatment the leucocytes had fallen to 16,800, but after two weeks the swelling had increased one-half an inch (1.5 cm.), and was appreciably harder, and my diagnosis of congenital syphilis was shaken; however, as the child seemed so much improved in every other way, I persisted in the inunctions. I then called in an eminent consultant, who suggested sarcoma, and advised an exploratory incision, with hip-joint amputation if sarcoma was found; but he felt possibly metastases had already taken place; but if not, and sarcoma should be found, permission should be obtained, in advance of any puncture, to go ahead with the amputation, for fear of metastases from the puncture. The child looked so rosy, bright, and merry that I determined to trust to "the trump" a little longer, with the result that the patient was discharged from the hospital on February 21st, with no induration in the right thigh and a freely movable joint. His general condition was excellent. To my mind it was a clear case of syphilitic osteochondritis. Carl Beck's paper on "Cartilaginous Cysts Near the Epiphysis of Long Bones in Children"[1] had not then appeared, else I should doubtless have added this disease to my difficulties; but he tells us the skiagraph differentiates this condition from osteosarcoma, in that the former gives a translucent appearance at its situation, with straight, sharply marked edges of bone, while sarcoma gives no such translucency and an irregular, external demarcation. Wiegel has called my attention to the mottled or spongy look in his excellent skiagraphs of sarcoma in bone.

Ridlon, in vol. iv. of the *Transactions of the American Orthopedic Association*, speaks of a number of syphilitic bone and joint lesions seen by him, and quotes from Bumstead and Taylor's *Venereal Diseases*

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[1] THE AMERICAN JOURNAL OF THE MEDICAL SCIENCES, June, 1901.

(fourth revised edition, p. 735) in support of his diagnosis, which had been questioned by eminent authorities and pronounced tuberculous, although his results with antisyphilitic medication were quite suggestive.

To what extent blood examinations will help us remains to be seen, and with the vast material at our command it would seem to me well to make blood examinations a part of our ward records in bone diseases, just as urine has been heretofore. This seems especially so, in our special work, when one thinks of the important part played by the bone-marrow in the genesis of blood. Such records should bring forth fruit in due season and increase our means of differential diagnosis. In attempting any inferences from the blood-finding in infants we must bear in mind that a normal leucocytosis exists, according to Schiff, Gundobin, Bayer, Hayem, and others, for we may have at birth from 17,000 to 21,000 white cells, and after the first feeding a digestion leucocytosis as high as 36,000. On the tenth day 10,000 to 14,000, and at the sixth month 12,000. After a meal 30,000 leucocytes is never a very high count in infants under two years. Cold baths likewise increase the leucocyte count. It is also to be observed that a backward child's blood is more of the infantile than of the adolescent type.

Cabot gives us an excellent foundation on which to build in *Clinical Examination of the Blood* (third revised edition, 1898), and I will refer to it for certain points on the blood in infancy and childhood:

"1. All signs by which sickness is shown in the blood of adults are exaggerated in children.

"2. All forms of infantile anæmia are apt to be associated with enlarged spleen.

"3. In infantile blood the small mononuclear elements are more numerous than in the adult ('lymphocytosis of infancy').

"4. The red cells show variations in shape and size, and nucleated reds may be found.

"5. The hæmoglobin is relatively high at birth and relatively low during childhood."

It is therefore important to make our observations before meals or a cold bath, to state the child's age, and, if possible, obtain a blood record before the sickness began, to determine how much is physiological and how much pathological.

To apply this practically for diagnostic purposes in tubercular osteitis or periostitis without abscess formation (according to Dana's observations), and without secondary infection (according to Brown's), we have no leucocytosis, while in syphilitic bone disease we have the leucocytosis of a secondary anæmia. The same is true in scurvy and rickets. Acute osteomyelitis can be diagnosticated from so-called "rheumatic pains," "growing pains," and neuralgia by the leucocytosis present.

The average leucocyte count for osteosarcoma in adults(?) is high—about 17,000. Injections of tuberculin produce leucocytosis; therefore blood counts should not be made immediately after such injections. Acute rheumatism gives about 16,000, subacute 9000, and chronic 7000 leucocytes, on an average.

Hereditary syphilis is perhaps the best-known cause of a relative lymphocytosis in children, but scurvy may produce the same result.

In infancy the percentage of eosinophiles is very often higher than in adults, so that in them eosinophilia may be considered physiological; but it is also very characteristic of malignant bone disease and osteomalacia, as found by Neusser and his pupils. Cabot, from whom I have obtained most of the foregoing, mentions having seen eosinophilia in osteomyelitis also. In some cases of syphilis and syphilitic disease of the spinal cord we find eosinophilia.

Myelocytes are found especially in malignant bone disease, hereditary syphilis, and acquired syphilis and other conditions where there is a grave anæmia with leucocytosis.

Normoblasts show more a severe secondary anæmia, and megaloblasts show a *very* severe secondary anæmia in bone disease as elsewhere. Applying this data to the case cited, we find the infant had 18,400 leucocytes and relatively increased lymphocytes, which would suggest exclusion of tuberculous bone disease in favor of syphilis or scurvy. Absence of nucleated reds, myelocytes, and eosinophilia, together with no marked diminution in the red count, would tend to exclude sarcoma from the preponderance of authority, especially as this was not what might be called a small tumor.

Thus, if this reasoning is logical, we would narrow down to syphilis and scurvy, and as the supposed subperiosteal hemorrhage was the only likely symptom of scurvy, hereditary syphilis alone remained.

Certainly, it seems to me, the blood examination was of value as an additional aid in the diagnosis of this case.

I will cite briefly another perplexing case.

CASE II.—H. R., aged eighteen months, son of a laborer, was admitted to the Hospital for Crippled Children, April, 1901, with a marked swelling extending from the upper border of the right hypochondriac region to the lower border of the right iliac region, and from the mid-axillary line around the right side of the loin nearly to the spinal column. The duration of this abscess was said to be four weeks; that is, the parents had noticed it for that length of time. In the lumbar region fluctuation was detected, and the pus seemed near the surface. The child was anæmic, emaciated, tubercular looking, and evidently in pain. Large furuncles were present on the occiput and right eyelid. The temperature was 101° F. The spine was rigid and double. Psoas-contraction of some 90 degrees was present, but no kyphosis or other deformity was apparent. Family history was good. The patient had been healthy up to September, 1900, when he had measles and whooping-cough, and had a traumatic history of having fallen down five or six steps and off a chair previous to the onset of the present trouble, a month ago. His father stated that in the morning the child was apparently well, playing and talking, and in the evening could not use the right leg. Pain had been constant since, with fretful nights, anorexia, thirst, fever, sweats, constipation, but no vomiting. Palpation in right iliac fossa gave no induration in the region of the appendix.

The symptoms and picture were those of Pott's disease, with double psoas-contraction and lumbar abscess, but no kyphosis.

The blood count briefly showed 40,000 leucocytes, a low red count, and low hæmoglobin, increased polymorphonuclear neutrophiles and small mononuclear leucocytes. Quite a number of cells resembling myelocytes and a few normoblasts were also found. This was against tubercular abscess in the extremely high leucocyte count and the presence of marrow cells found, as an incision demonstrated, evacuating 500 c.c. of thick greenish pus, sometimes mixed with blood, from which cultures showed the presence of the staphylococcus pyogenes aureus. The abscess cavity was curetted and drained, and the child showed rapid improvement. The psoas-contraction gradually yielded to traction in the line of the deformity.

THREE NOTEWORTHY CASES OF BRAIN INJURY.[1]

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DURING THE WAR WITH SPAIN.

From the earliest dawn of medical science injuries of the brain—the seat of life and of intellect, if not the soul—have furnished an interesting field for study. The correct explanation of concussion—the mechanism by which laceration and hemorrhage take place without fracture, the laws which govern the direction of the lines of fracture, the prognosis as to life and health and intellect, and the best methods of treatment, are problems which have attracted the attention of surgeons and physicians from the days of Hippocrates, and are still burning questions for consideration by the surgeons of our day.

The dangers in cerebral injuries are shock, hemorrhage causing compression or anæmia, and infection.

The symptoms of shock occur immediately; those of hemorrhage at the same time or a few hours later, occasionally as much as a week later, and those of infection from two days to a week, or even several months or years after an injury, possibly as a result of a second injury which arouses a focus of infection which has long remained dormant.

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[1] Read at the meeting of the Association of Military Surgeons of the United States, 1901.

Shock so often co-exists with hemorrhage that in many cases it is impossible to know just how much of the symptoms to attribute to shock and how much to hemorrhage.

The remote effects are abscess, tumor, epilepsy, insanity, and chronic headache.

The work of a brilliant galaxy of neurologists and surgeons, composed of Ferrier, Broca, von Bergmann, Starr, Keen, Victor Horsley, and others, in cerebral localization and operations on the brain during the last quarter of the century just ended, has established surgery of the brain on a firm basis, and has proved that with the exercise of proper judgment, skill, and antiseptic precaution this dangerous region can be invaded with almost the same impunity as that which follows operations on the abdominal viscera—an impunity that is so nearly the rule that the abdominal cavity has been termed the "playground of the surgeon."

The large amount of brain tissue that can be destroyed without producing death and the toleration by the brain of the presence of foreign bodies are remarkable. Two examples of the latter, selected from many reported cases, may be mentioned: Evans reports a case in which a piece of wood, one and a quarter inches long and a third of an inch thick, remained in a man's brain, just above the ethmoid bone, for thirty-two years. Forwood reports the case of a soldier who was in good health five months after having been shot in the forehead, the Mauser bullet, as shown by a radiograph, remaining lodged in the posterior part of the brain about the tentorium cerebelli.

According to my experience, the greatest mortality occurs in injuries which are caused by falling from a height and striking on the head, such as being thrown by a horse, falling from a building or scaffold or a rapidly moving car, or taking a "header" from a bicycle. Such cases are usually accompanied by extensive fracture of the skull, involving both the base and vertex, with numerous lacerations and hemorrhage in the substance of the brain. Of almost equal fatality are gunshot wounds of the brain, while the injuries resulting from blows upon the head by clubs, hammers, hatchets, and stones give the smallest mortality, such cases usually consisting in a limited fracture of the skull, with a corresponding lesion in the brain.

The treatment will naturally depend upon the nature of the injury. Symptoms of compression from hemorrhage, depressed bone, or other foreign body demand operative interference. Gunshot wounds of the brain, unfortunately, in the majority of cases are not benefited by operation. In the few cases in which the patient survives the shock, and the ball can be located by means of the Röntgen ray in an accessible locality, it should be removed in order to prevent the development of abscess, cyst, tumor, or other dangerous sequel.

The following three cases have been selected from my note-book as worthy of being reported:

CASE I. *Severe hemorrhage, with laceration of the brain, without fracture of the skull or rupture of the dura mater.*—K. M., aged eighteen years, white, native of the United States, was admitted to the Emergency Hospital, August 10, 1899, having just been struck on the head with a club and knocked down. On being assisted to his feet he walked a short distance, fell again, and lapsed into complete unconsciousness.

Examination one hour after the injury. Patient profoundly unconscious; breathing deep, sometimes sighing; both pupils dilated and immobile; the pulse 60, and full; clonic contraction at short intervals of the right arm and leg, and sometimes the left arm, with persistent tendency of the face to turn to the left side. A small contused wound of the scalp, not extending to the bone, was observed just above the left ear.

A diagnosis of cerebral hemorrhage was made, and the patient was immediately prepared for operation. No anæsthetic was necessary. A large flap of scalp was turned down on the left side of the head, but a careful examination failed to detect any fracture of the skull. By means of a trephine and bone forceps a section of the skull 10 cm. in diameter was removed over the fissure of Rolando, when the dura mater was disclosed, bulging, tense, without pulsation, laceration, or rupture. On incising the dura a large black clot of blood, about the size of an orange, popped out. A freely bleeding artery on the surface of the brain was ligated and the finger was gently passed around the opening beneath the dura, but no further clots were discovered. There was no pulsation in the portion of the brain exposed. A grooved dilator was passed into the left lateral ventricle, but nothing was discovered.

The only change caused by the operation was contraction of the pupils and a diminution in the frequency of the convulsions, and the patient died about two hours later without becoming conscious. The necropsy revealed numerous small hemorrhages throughout both hemispheres.

This case affords an excellent clinical illustration of the elasticity of the skull in permitting such an extensive injury to the brain without fracture of the skull or rupture of the dura mater, as shown by Felizet's well-known experiment of filling the skull with paraffin, then dropping it on the floor from a height, when it is found that the paraffin is flattened or indented at the point of impact without fracture of the skull.

CASE II. *Compound fracture of the frontal and nasal bone, with depression of almost the entire frontal bone.*—E. M., aged twenty years, native of the United States, white, female, typewriter, was admitted to the Emergency Hospital, July 21, 1899.

History. The patient had been injured in a collision between two "roller coasters" by being struck in the face by some object the nature of which was not certainly known, but it was thought to have been the back of another person's head. Unconsciousness resulted, but only lasted for a short time, and on admission to the hospital the patient was perfectly conscious, the nose was bleeding freely, and she occasionally vomited black blood, which she had probably swallowed. Both eyes were closed by the swelling. The upper part of the nose and almost the entire frontal bone were depressed to the depth of from 1 to 2 cm.

The patient was prepared for operation by shaving and disinfecting the scalp, and the operation was performed about three hours after the injury. An incision was made from one temple to the other across the top of the head through the edge of the hair, just behind or above the line of depression, and the anterior flap reflected forward. The line of fracture was then seen to extend from the nasal bones through the left supra-orbital ridge, upward and outward, and then across through the frontal bone about 2½ cm. anterior to the coronal suture to the opposite side of the head; then downward and forward to the right temporal fossa, just behind the external angular process of the frontal bone. Two other lines of fracture extended from the principal one—one on either side—in a direction backward through the remainder of the frontal and into the parietal bones to an unknown distance. The parietal bones were freely movable, but were not displaced. That portion of the frontal bone included in the line of fracture was depressed and overlapped by the surrounding bone, the depression being most marked at the superior border. The depressed bone was elevated by means of a lever passed down to the nasal eminence between the skull and dura mater; the edges of the fractured bones were carefully adjusted, the scalp united with silkworm-gut sutures without drainage, and a dressing applied. The first dressing was made on the tenth day after the operation, when primary union was found to have taken place, and the stitches were removed. There was some bleeding from the posterior nares for the first three or four days, but the patient recovered without incident, and left the hospital at the end of two weeks.

At this time, one year and ten months after the injury, the patient's condition is as follows:

She is able to attend to her work, but has occasional spells—once in two or three months—of a highly nervous character, with mental depression, excitability, headache, and insomnia, lasting from two or three days to a week—possibly the premonitory symptoms of epilepsy or insanity. The physical deformity is not very great; the nose is somewhat broadened at the base, and the left frontal eminence is a little less prominent than the right; there is a slight internal squint of the left eye, and the patient has lost the sense of smell, evidently from injury to the olfactory nerves from fracture of the ethmoid bone or inflammatory thickening of the dura mater. A remarkable feature of this case was the extensive fracture of the skull, including both the base and vault, but especially the latter, with comparatively little damage to the brain.

CASE III. *Compound fracture of the skull, with loss of brain; recovery.*—E. H., negro, aged thirty-eight years, native of Virginia, laborer, was admitted to the Emergency Hospital, February 6, 1901.

History. The patient had just been struck on the head by a portion of a rapidly revolving wheel which had broken. He was not unconscious, but in a dazed condition, and apparently unable to talk or to understand what was said to him. He had lost considerable blood, and was suffering from shock, so 500 c.c. of normal salt solution were injected into the left median basilic vein. A wound involving both scalp and skull extended 15 cm. from a point 2½ cm. above and the same distance in front of the right ear backward and upward to a point 11 cm. above the external occipital protuberance. Blood clots and brain tissue protruded along the entire wound. There was conjugate deviation of the eyes toward the side of the injury, and partial paralysis of the left side of the face and the left upper and lower extremities.

After shaving and disinfecting the head the operation was begun without an anæsthetic, but as the patient was restless, turning his head from side to side, chloroform was given. The blood clots and brain tissue projecting, and seven fragments of bone buried in the brain, were removed and a branch of the middle meningeal artery ligated. The opening in the skull was shaped like a dumb-bell, the anterior extremity —about 4 cm. in diameter—being the larger. The dura mater was so much lacerated as to render the use of sutures impossible, and as the brain continued to project through the skull, it was kept in place by packing over two square metres of gauze into the cavity of the skull. The scalp was then united by sutures, leaving three openings through which the ends of the gauze projected, so that it could be removed at the proper time.

February 7th. The patient is doing fairly well, but decidedly apathetic and indifferent to his surroundings. Right conjugate deviation of the eyes still marked. No evidence of pain on pricking the left arm and leg, and only slight on pricking the face. He was able to move the left arm and leg, but rather weakly, the arm being weaker than the leg.

9th. The gauze packing is renewed. A rough test shows the existence of left homonymous hemianopsia.

18th. The conjugate deviation has about disappeared, the patient being able to turn his eyes in any direction. His mind is clear, but he seems to cerebrate slowly. Hernia cerebri occurred in each of the openings left for removing gauze, and was controlled by packing as in the beginning, changing the dressing once in two or three days.

27th. Three weeks after the injury the patient was permitted to get up. He was able to walk by holding to objects and dragging the left leg. He complains of a sensation of pins and needles in the left arm and leg.

March 9th. Thirty-one days after the injury the fungus cerebri has all disappeared, and the surface of the brain has sunk to a distance of at least 2½ cm. below the surface of the skull. The left arm and leg are much stronger, and the patient is able to walk about without holding to objects. The eyes were examined by Dr. Swann Burnett, who confirmed the diagnosis of left homonymous hemianopsia. The test for Wernicke's symptom was not made.

When last examined, April 27th, the wounds were entirely healed, and the patient walked without limping. The left hand is almost as strong as the right, but he has difficulty in approximating the thumb to the tips of the fingers, so that fine movements, such as buttoning his clothing, are impossible. This is from absence or dulness of the tactile sense, as he can approximate them by an effort while looking at them, but is unable to do so unless he sees them. The mouth is drawn slightly to the right side. Left homonymous hemianopsia is still well-marked, and there is also partial deafness of the left ear. The sense of smell seems to be normal.

In this case the patient lost at least two ounces of brain. As mapped out on the skull, the wound in the brain must have extended from a point just below the division of the fissure of Sylvius into its two branches, backward and upward, crossing the lower extremity of the fissure of Rolando, and gradually diverging from it posteriorly as it approached the median line of the skull, involving the first temporo-sphenoidal convolution, which would account for the partial deafness, the supramarginal and angular convolutions, and possibly the cuneus hence the homonymous hemianopsia.

The conjugate deviation of the eyes is not easily explained if it is assumed that this phenomenon depends on injury to the second frontal convolution, as the wound was situated some distance behind and below this convolution. The third frontal convolution might have been involved in the lesion, so it seems fair in this case to attribute the conjugate deviation to injury of this convolution.

The loss of tactile sensation in the left hand, and to a less degree in the foot, was to be expected from injury to the posterior motor area. According to Starr, "the parts susceptible of the finest and most delicate movements, those directed by the most acute sensations—the lips, the fingers, and the toes—lie furthest back in the motor area, chiefly in the posterior central convolution. Lesions in this convolution almost always cause some loss of tactile sensation as well as paralysis."

As the patient was right-handed and the injury was on the right side there were no symptoms of aphasia—no interference with memory of any kind—as there would undoubtedly have been had the same lesion occurred on the left side.

TUBERCULOSIS OF THE PORTIO VAGINALIS AND CERVIX UTERI; ITS PATHOLOGY, DIAGNOSIS, AND TREATMENT.[1]

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TUBERCULOSIS of the female genital organs has been known to the medical profession for many years. Raymond, a French writer, and others, described lesions of these organs as early as 1831. Such studies, and those during more than fifty years following, were simply discoveries of far advanced lesions in subjects dying of phthisis or more or less general tuberculosis. They were of interest only to the pathologist. It was then believed, as was asserted by Lebert and Rokitansky, that the diagnosis of genital tuberculosis in the living female was not possible. The first publication worthy of notice which considered the disease in this part of the body from a clinical stand-point, fully warranting the contradiction of the above statement, was the monograph of Hegar (1886), entitled *Die Entstehung, Diagnose und chirurgische Behandlung der Genital tuberkulose des Weibes.* This work distinctly marks an epoch of advance in our knowledge of the early pathology, diagnosis, and treatment of genital tuberculosis, and it has formed a groundwork for more accurate and extensive practical studies during the succeeding years. The collaboration of the literature and personal studies of tuberculosis of the Fallopian tubes, ovaries, and vagina are now frequently in evidence, and it may be said that at present their pathology and clinical significance is as well appreciated as that of tuberculosis in any other part of the body.

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[1] Read before the Thirteenth International Congress of Medicine, Paris.

Tuberculosis of the portio vaginalis and cervix uteri, however, have not met with the same degree of consideration, though clinically at least of equal importance. Tubercular infection here is of very rare occurrence, but it has seemed to the writer that the pathology, symptomatology, and treatment of a sufficient number of cases have now been carefully described to afford deductions which are of practical value.

My studies in this direction, of which I can here offer only a short résumé of conclusions, was instigated by the clinical observation and pathological studies of one instance of the disease, followed by a careful survey of thirty two post-mortem, twenty-two clinical, and fifteen clinical and post-mortem observations taken from the literature.

The case coming under my notice was admitted to the University Hospital on March 27, 1899. The patient was an American white woman, aged twenty-three years. Her previous personal and family history was good and free from tuberculosis. Her husband was healthy. She was married in October, 1898, but was never pregnant. Menstruation appeared at eighteen years of age, but was very slight in amount, and occurred only every two, three, or five months. She had not menstruated since marriage. Leucorrhœa, profuse and extremely offensive, had been present for three years. There was a slight discharge of blood on two occasions after sexual intercourse. Since puberty, unconnected with the menstrual period, she had experienced every month or two mild attacks of aching pain in the left inguinal region, which seemed to be induced by exercise. She believed her present illness to date from nineteen years of age, and since then she had gradually failed in health. Two weeks before coming under observation she was taken with severe pain in the left side of the abdomen, backache, frontal headache, and pain in the lower extremities, had fever and a rapid pulse, was much exhausted, and compelled to go to bed. After a few days' treatment for la grippe she was better and able to be out of bed, but, because of continued pain in the left side and the presence of a profuse and offensive mucopurulent vaginal discharge, her physician suspected uterine and ovarian disease, and accordingly made a vaginal examination. He found the vaginal cervix hard and indurated and the seat of a growth which bled easily to touch. Considering these local symptoms highly suspicious of carcinoma of the cervix, he transferred the patient to my care.

On admission to the hospital the patient still complained of considerable pain in the left inguinal region, sacral backache, frontal headache, loss of strength, and general malaise. A careful study of the urine determined it to be microscopically and chemically normal.

VAGINAL EXAMINATION. The vaginal outlet and vagina were nulliparous and normal. The vaginal cervix was irregular in shape and very much hypertrophied, being nearly twice the normal size. The mucous membrane of the portio vaginalis for a distance of from 1 cm. to 2 cm. surrounding the external os was eroded and of a bright rose-red color. The whole surface of the cervix was hardened, indurated, and bled easily to touch, and in some respects resembled in appearance the beginning cauliflower-like epithelioma of the portio vaginalis. On making a closer examination the cervical canal was found dilated, admitting the tip of the index finger. The finger detected an irregular, papillary growth, the size of a hickory-nut, arising from the posterior wall of the cervical canal just within and without the external os. It grew from rather a broad surface, perhaps 1.5 cm. in diameter, filled and dilated the cervical canal, and protruded on to the vaginal surface of the posterior lip.

This growth was of the same character as the less extensive disease spoken of as erosion, which extended from the cervical canal and surrounded the external os in other directions. There were no ulcers or necrotic changes demonstrable to the naked eye. The disease was strictly limited to the cervical canal and portio vaginalis in a manner very similar to papillary erosion in the nulliparous cervix. The papillæ were small, finger-like projections attached to a distinctly indurated underlying cervical tissue. They were not friable, but were elastic to touch. Although the whole cervix was hard and indurated, it was not as resisting as that in any form of carcinoma. The bleeding caused by palpation was slight and resembled that sometimes seen in the papillary erosion of laceration of the cervix. The uterus was retroverted to the second degree, slightly movable, and very small in size. The left ovary was found prolapsed and adherent behind the uterus. There were no nodules to be felt along the course of the tube, although it was distinctly determined to be hardened and diseased. The right tube and ovary were also strongly adherent and diseased, and were demonstrable in immediate relation with the lateral wall of the uterus.

From the above history and the appearance and structure of the diseased cervix the lesions were considered to be due to one of three rare diseases—tuberculosis of the cervix, malignant adenoma of the cervix, or syphilis of the cervix.

Because of the age of the patient, the history of amenorrhœa in a nulliparous woman, the fact that the growth grew from the mucous membrane of the cervical canal and not from the portio vaginalis, with the absence of any tendency to friability and with the presence of a half-elastic feeling to the diseased tissue, we were at once thoroughly convinced that the disease was not the cauliflower-like epithelioma of the portio vaginalis, nor did it in any way resemble the other forms of carcinoma of this portion of the uterus.

Since there was no history of syphilis to be gained from the patient or her husband, nor local skin indication of this disease, and knowing the history of amenorrhœa and other symptoms antedating marriage would at least be more likely to be caused by tubercular disease, syphilis was almost wholly excluded.

The long-continued absence of the menstrual flow, with the presence of strongly adherent tubes and ovaries and a small uterus, were points against the diagnosis of malignant adenoma of the cervix, yet we were by no means convinced that this disease was not present, for the growth originated in the cervical mucous membrane.

The history of only fairly good health during a long period, amenorhœa with complete absence of the menstrual flow for six months, the presence of a papillary growth from the cervical canal in a young, nulliparous woman, associated with a small uterus and demonstrably very chronic tubal disease, surrounded with dense adhesions, without history of origin, with also the satisfactory exclusion of the other diseases named, caused me to put down in the hospital record the probable diagnosis of tuberculosis of the cervix, retroversion of the uterus, and tuberculosis of the adnexa. Following our customary plan, however, a portion of the papillary tissue was excised and examined microscopically. This examination positively determined the disease to be the papillary form of tuberculosis, the specimen containing the characteristic miliary tubercles and Langhans' giant cells.

The operation of thorough curettement, high amputation of the cervix, and bilateral salpingo-oöphorectomy was performed on March 29, 1899. The permission for a more radical operation could not be gained from the patient.

The convalescence was normal, and at the time of writing, sixteen months after operation, she had gained many pounds in weight, and no new symptoms had developed. A physical examination of the chest and abdomen determined nothing abnormal, there were no indications of remaining tubercular disease, and the patient was apparently perfectly healthy.

Macroscopic Examination. The portion of the vaginal cervix removed by amputation presented a cut muscle surface, a smooth vaginal mucous membrane surface, and a surface covered with erosion or small papillary outgrowths. The papillary growth began about 1 cm. within the cervical canal, and extended out on the portio vaginalis as already described. It was most extensive and best developed on the posterior cervical wall and posterior lip of the portio vaginalis, forming here a nodule the size of a small hickory-nut. The nodular growth was directly continuous with similar but less developed growths surrounding the cervical canal and external os. They were flat papillary growths, an excessive papillary erosion, composed of minute finger-like projections, rose-red in color, elastic yet firm in consistency, and showing no indication of degenerative changes. The Fallopian tubes were those of a chronic endosalpingitis. The ovaries were macroscopically normal.

MICROSCOPIC EXAMINATION. Microscopic sections were cut longitudinally, parallel with the direction of the cervical canal upon all sides, extending the length of the cervix amputated. In all of these sections the squamous epithelium of the portio vaginalis showed an inflammatory change, beginning by proliferation 1.5 cm. from the external os and progressing in some places to complete destruction at the external os. The cells were first distinctly outlined, then became a homogeneous mass, which gradually disappeared. Beneath the squamous epithelium there was generally distributed an extensive small round-celled infiltration, with many leucocytes, which to some extent infiltrated the squamous epithelium layer. The papillæ spoken of as growing from the cervical canal beyond the external os were slender finger-like processes growing close together, covered with columnar and cuboidal epithelial cells. The stroma was infiltrated with small round cells, polymorphous leucocytes, and here and there a miliary tubercle, often containing a typical Langhans giant cell. The underlying endometrium and a considerable portion of the new cell tissue showed the same character of changes. No degenerative change was found in any section, but considerable fibrous change was always present, rather indicating a beginning chronic fibroid tuberculosis.

A microscopic examination of the corporeal endometrium and Fallopian tubes determined the same character and stage of tubercular disease. Sections from the cervix, corporeal endometrium, and Fallopian tubes were stained for tubercle bacilli, and in each a few bacilli were found after several had been prepared.

The primary seat of infection was not determinable, but it is probable this case was one of descending tuberculosis.

DIAGNOSIS. Chronic diffuse tuberculosis of the portio vaginalis, endometrium, and muscle tissue of the cervix (tubercular papillary hyperplastic endocervicitis), tuberculosis of the corporeal endometrium and Fallopian tubes.

From a study of the literature, as before said, I have been able to collect sixty-eight—adding my own, sixty-nine—cases of tubercular infection of the uterus below the internal os; thirty of these were post-mortem discoveries, associated with far advanced tubercular lesions in other parts of the genital tract and distant parts of the body; two were post-mortem discoveries of primary tuberculosis of the cervix (Friedlander and Kaufmann); twenty-two were clinical observations alone—of these three were associated with lesions in other parts of the genital tract and distant parts of the body; four with lesions in distant parts of the body alone; six with lesions in other parts of the genital tract alone; and in nine the disease was localized to the cervix alone, or it is not stated as to whether other parts were infected. Fifteen cases were observed both clinically and post-mortem, all of which were associated with tuberculosis in other parts of the body.

The age of the patients was recorded in fifty-seven cases as follows: From seventeen to twenty years, 6; twenty-one to thirty, 27; thirty-one to forty, 9; forty-one to fifty, 5; fifty-one to sixty, 5; sixty-one to seventy, 3; seventy-one to seventy-nine, 3, showing very distinctly that the disease is most frequent during the period of sexual activity. There seems to be no relation between the character of tuberculosis and the age of the patient.

The disease was localized to the portio vaginalis in nineteen cases and to the cervical canal in six cases. In the remaining forty-four cases both the portio vaginalis and cervical canal were infected.

The clinical character of the disease is to be distinctly divided into three varieties: tubercular ulceration of the cervix, tubercular papillary hyperplastic endocervicitis, and miliary tuberculosis of the cervix.

Ulcerative Form. This variety appeared as single, large, or as multiple minute (size of a linseed) ulcers distributed over the portio vaginalis or cervical canal, or as an ulcerative process quite completely excavating the entire cervical canal and destroying the portio vaginalis. The ulcerative process commonly surrounded the external os, extending along the cervical canal and over the portio vaginalis. In other cases an ulcer was seen on the portio vaginalis, surrounded by normal mucous membrane. The ground of the ulcers was usually white to yellowish in color. When of any size they were excavated, with sharp edges. The cervix was often hypertrophied. Microscopically a necrotic surface was seen, beneath which were all of the usual tissue changes of chronic diffuse tuberculosis. This tubercular change was in the early cases localized to the mucous membrane and the immediate underlying muscle tissue of the cervix, but in the far advanced cases the muscle tissue was destroyed to extensive excavation, even to almost complete destruction of all cervical tissue. Bacilli were sought for and found in the tissue in sixteen cases, in the vaginal discharge in one case. In two instances they were diligently sought for, but could not be found.

Tubercular Papillary Hyperplastic Endocervicitis. This form of tuberculosis involved the cervical endometrium, particularly the lower half of the endometrium, and extended out on to the portio vaginalis, as does the common papillary erosion. Such erosion, however, is excessively hyperplastic, and quite frequently forms a tumor, which in one instance reached the size of an apple (Emanuel). The cervix was always hypertrophied and usually irregular in shape. It was indurated, but elastic. The growth was composed of small, finger-like projections, rose-red in color. Rarely, slight indications of caseation were seen.

The microscopic pathology of some of the cases described shows there is much evidence that in the beginning the disease is here a tubercular catarrhal endocervicitis, extending to the gland structure, often causing excessive hypertrophy and hyperplasia of the gland cells, even to a change into epithelioid cells and miliary tubercles. At other times the gland cells were little changed, and the tubercular process was most pronounced in the stroma tissue. The stroma tissue was always more or less involved. The microscopical character was, except in two instances, a chronic diffuse tuberculosis. In these two cases it was a beginning chronic fibroid tuberculosis. From the various descriptions, and with the careful study of my own case, it would seem to me that, aside from the presence of tubercular tissue, the macroscopic character of this variety strongly resembles the papillary erosion of Ruge and Veit, with excessive hyperplasia of all structures, giving the macroscopic appearance of papillary or even small cauliflower-like outgrowths. It is not a vegetative or papillomatous growth, as described by Cornil, Vitrac, Fränkel, and others, but, in the sense of Ruge and Veit, an excessive papillary erosion caused by the infection of the tubercle bacillus.

Tubercle bacilli have been found in the tissue in eight of the fourteen cases reported. Bacilli were diligently sought for by Zweifel and Michaelis, but not found.

Miliary Tuberculosis of the Cervix. Two cases of this variety have been reported (Virchow and Rigal-Cornil). They are characterized by the presence of minute miliary tubercles scattered over the portio vaginalis, associated with extensive and advanced tuberculosis on other parts of the body.

The large majority of the cases of tuberculosis of the cervix thus far described have been secondary infections, there being only three positive instances where it was satisfactorily proved that no other organ or tissue was involved. (I refer to the cases of Friedlander, Kaufmann, and Michaelis.) Cases of possible primary infection of the cervix, with secondary infection of other parts of the genital tract or body, are those of Emanuel, Meyer, Zweigbaum, Derville, Vitrac, and Bouffe.

Symptomatology. The subjective symptoms of tuberculosis of the cervix are indefinite and in no way characteristic of the disease. In most instances the symptoms have been referable to lesions in the uterus, tubes, or peritoneum. The patients were mostly well-nourished and in good physical condition. Rarely they were anæmic and had failed in health. Many complained of malaise, indefinite and irregular pains in the lower abdomen, a feeling of weight in the pelvis, and more or less sacral backache.

The most frequent symptom in those cases carefully observed has been an abnormally profuse purulent leucorrhœa, now and then tinged with blood. Leucorrhœa was a symptom in twenty-four of the thirty-seven cases observed clinically.

Menorrhagia was present in thirteen cases. In four of these the uterus was much enlarged; one contained a fibroid tumor, and in two retroversion of the uterus was present.

Amenorrhœa was present in twelve cases. In five of these the uterus was abnormally small and in one greatly enlarged.

In three cases where the menstruation was normal the uterus was of normal size.

It would seem that to a great extent menorrhagia and amenorrhagia in tuberculosis of the cervix were dependent upon the presence of hyperplasia and aplasia of the uterus or independent disease of the uterus.

The objective symptoms depend upon the form of the tubercular lesion, the appearance varying as described in the consideration of their pathology.

The two varieties of clinical importance are the tubercular papillary hyperplastic endocervicitis and the ulcerative form. The disease of the cervix in these cases, perhaps, at first sight resembles either the cauliflower epithelioma or the excavating crater-like carcinoma of the cervix; but taking my own experience in the first variety, and accepting the description of other authors in the second variety, I would very positively say that there are many distinct characteristics of difference between carcinoma and tuberculosis of the cervix. However, since the experience of any one observer of this disease has been narrow, I am unable to absolutely contradict the statement of Péan and others who have described such cases as having all of the objective symptoms of carcinoma; yet I believe, if a careful examination of the cervix is made by an experienced clinician, these diseases can generally be separated one from the other.

The papillary form of tuberculosis of the cervix bleeds to touch, but not so early or to the same extent as carcinoma of the cervix. The bleeding may be compared to that sometimes seen in papillary erosion of the lacerated cervix. The tissue in tuberculosis of the cervix is not easily broken or friable, but has an elastic, velvety feeling, which is never present in carcinoma. Induration is present, but it is not the hard, resisting induration of adenocarcinoma. On the other hand, the tissue is more resisting than that of epithelioma of the portio vaginalis. In most cases of the papillary variety the tissue of the portio vaginalis is lobulated, the vaginal cervix irregular in shape, and the papillary tissue usually fills and extends from the cervical canal. The ulcerative form is a more or less extensive necrosis, an ulcer or ulcers, with sharp, well-defined edges covered with caseous tissue. Here, too, the tissue has an elastic feeling. The friability of carcinomatous tissue is absent, and the induration differs distinctly from carcinoma. The history, age of patient, and duration of disease are important factors of diagnosis.

The tubercular papillary hyperplastic endocervicitis resembles in appearance and structure excessive non-tubercular papillary erosion of the cervix, and the presence of such an erosion with early bleeding—particularly where there is a history of tuberculosis—should be the cause for suspicion of tuberculosis and indicate microscopic examination before treatment is considered. The tubercular papillary erosion also resembles in appearance and structure the rare cases of malignant adenoma of the cervix.

Further, this form in many respects resembles the syphilitic condyloma of the cervix.

The ulcerative form resembles syphilitic chancre, chancroid ulcus rodens, or carcinoma of the cervix. The method of differential diagnosis in the first two instances will be apparent; in the latter instances by the objective symptoms and a microscopic examination.

As in early carcinoma of the cervix, a diagnosis of tuberculosis of the cervix must always be that of suspicion, made positive by microscopic examination of excised tissue. This was the method of diagnosis in ten of the cases referred to.

The clinical diagnosis in fifty-six of the cases reported in the literature was as follows: Carcinoma or suspected carcinoma, 14; sarcoma, 1; ulcer of cervix, 4; ulcus rodens, 1; vegetative growth of cervix, 1; indefinite disease of the cervix, 2; phthisis or tubercular peritonitis, 28; tubercular meningitis, 1; apoplexy, 1; abdominal tumor, 2; caries of spine, 1.

TREATMENT. The treatment of tuberculosis of the cervix must be to a very great extent identical with that of tuberculosis of the Fallopian tubes, ovaries, and uterine body—as a rule, operative. In those cases where there are extensive tubercular lesions in other parts of the body, or where the genital tuberculosis is only a minor cause of the patient's ill health, no treatment aside from local application or cauterization of the cervix is indicated. If there exists a latent tuberculosis in another part of the body which cannot be influenced to acute re-development by the necessary operative measures, and the lesions of the genitals are the chief cause of the patient's illness, then the treatment should be radical operation—panhysterectomy. Should there be tuberculosis of the Fallopian tubes, ovaries, or uterus, with tuberculosis of the cervix, again panhysterectomy should be the operation of election, though, as in my own case, amputation of the cervix, curettement, and bilateral salpingo-oöphorectomy has as well effected a cure. Tuberculosis localized to the cervix and corporeal endometrium is best treated by panhysterectomy, but curettement and amputation have effected a cure. Primary isolated tuberculosis of the cervix is to be treated in a similar manner, but panhysterectomy is less imperative. Local application and cauterization are at best only palliative, and should be condemned except in those cases where there is advanced tubercular disease in other parts of the body.

Fifteen of the cases referred to in this paper were treated by surgical means: Ten by panhysterectomy; one by curettement, amputation of the cervix, and bilateral salpingo-oöphorectomy; and four by amputation of the cervix. Local applications were applied in eleven cases.

Where the operation was panhysterectomy, seven completely recovered; six are doing well after five and a half years; one after four months. Three died: one of shock following operation, one of phthisis, one of tubercular peritonitis. Where amputation of the cervix was the operation, two recovered and remained well, and two died of phthisis. In the case where bilateral salpingo-oöphorectomy, curettement, and amputation of the cervix were performed the patient was healthy, apparently free from tuberculosis, sixteen months after operation. Where local application, cauterization, was the treatment, one is said to have recovered, five were temporarily improved, and in five the disease progressed.

I am indebted to Dr. H. L. Williams for the preparation of the microscopic sections and much assistance in their study. A complete report of this study of tuberculosis of the portio vaginalis and cervix uteri will appear at a later date.

REMARKS ON THE DIAGNOSIS OF SOME FORMS OF OPHTHALMOPLEGIA.

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I desire to correct some errors in the rules laid down by certain authors which are supposed to guide us in locating lesions affecting the ocular muscles governed by the third nerve, more particularly those lesions involving the nucleus of the third nerve and those involving the root fibres of this nerve in the tegmentum of the crus cerebri.

The internal and external muscles of the eyeball, together with the levator palpebræ, are governed by the third, fourth, and sixth cranial nerves, which have their origin upon the floor of the fourth ventricle and the aqueduct of Sylvius. The course of these nerves to their exit at the base of the brain is markedly different, and, therefore, in considering tegmental lesions, we have to deal more particularly with the third nerve whose root fibres penetrate this body to reach its exit at the sulcus oculomotorius.

Gudden[1] was the first to point out by his experiments on rabbits that there was a crossing of the root fibres of the third nerve at its nucleus, and later Perlia[2] demonstrated that a similar condition existed in man. These views have been substantiated and described by Kolliker,[3] Edinger,[4] Manakow,[5] Bechterew,[6] and more recently by Bach.[7]

It is now conceded by most authors that there is a decussation of some of the fibres of the third nerve, and, indeed, that this decussation takes place above the posterior longitudinal bundle and is confined to the posterior part of the nucleus. Duval and Laborde,[8] however, are still of the belief that the decussating fibres are component parts of the posterior longitudinal bundle.

Some authors have attempted to subdivide each nucleus of the third nerve into various groups of cells, attributing to each one of them the function of governing a single muscle. These classifications have been made principally by physiologists and clinicians, and are not substantiated by the careful anatomical researches made by Kolliker, Bach, and others, who believe that such sharp divisions are not justifiable.

Among the first to attempt to locate the nuclei governing the various functions of this nerve were Hensen and Volckers.[9] Their experiments consisted in irritating electrically various parts of the nucleus in dogs, and thus eliciting muscular contraction. Later Kahler and Pick[10] devised an arrangement of these nuclei, basing their conclusions on two cases of hemorrhagic lesions in the tegmentum. Some years later Starr[11] constructed a table slightly modifying the one of Kahler and Pick. This table was formulated by deductions made from some twenty cases, many of which were without autopsy.

There is still another scheme by Kneis[12] which is arranged in accordance with the function of the third nerve. He believes that all the muscles innervated by this nerve, excepting the inferior oblique, have their nuclear origin on the same side of the brain and that the latter crosses to the other side. Hence "the motor oculi nucleus of each side contains the nuclei of those muscles which take part in the movement of the eyes toward the opposite side—*i. e.*, the internal, superior, and inferior recti of the same eye, and the inferior oblique of the opposite eye."

In support of the Kneis theory the following statement is made by Hansell and Reber:[13] "Wishart[14] states that when the image of the affected eye is straight and that of the sound eye tilted nuclear lesions of the same side as the palsied eye may be diagnosed, because as the fibres of the third nerve diverge to the nucleus a few of them pass through the raphe and cross over to the nucleolus for the inferior oblique in the opposite nucleus, and the inferior oblique of the affected eye thus escapes involvement while the inferior oblique of the sound eye is palsied."

As this case of Wishart would verify the Kneis theory, I shall take the liberty of reviewing the same.

Mrs. B., a strong and healthy looking white woman, thirty years of age, was first seen at the clinic at the Eye and Ear Hospital, August 11, 1897. She stated that on July 21st last she had an attack of vertigo, of moderate severity, which passed off completely in the course of a day or two, and one week later she noticed drooping of the lid of her left eye. She said that she had always been in good health, had never had a miscarriage, and positively denied any specific taint.

Examination. In the right eye the pupil measures 3 mm. in diameter, and reacts promptly to light and accommodation. Vision 20/xx, with plus 3 sph. 20/xx. With correction (plus 3 D.) reads Jaeger No. 1, 8—21 ins. In the left eye the pupil measures a little over 6 mm. in diameter, and fails to contract to light or accommodation. Vision 20/cc, with plus 3 sph. 20/xx nearly. In this eye (the left) there is complete paralysis of accommodation, complete ptosis, divergent strabismus, and loss of movement in all directions except outward. There is secondary deviation of the right eye outward. Crossed diplopia, the image of the left eye being higher than its fellow and upright, the upper extremity of the image of the right eye being inclined to the right. The lateral distance between the images increases as the test object is carried to the right. If the test object is moved upward the difference in height and the inclination of the image of the right eye increase.

The loss of movement inward, upward, and downward of the left eye indicates paralysis of the internal, superior, and inferior recti, while the preservation of outward movement and the upright character of the image shows that the external rectus, superior and inferior obliques are not affected. There is no apparent limitation of movement in the right eye, but the upper extremity of the image seen by this eye is inclined to the right. In paralysis of an inferior oblique muscle the upper extremity of the false image is inclined toward the affected side—*i. e.*, in paralysis of the right inferior oblique the upper extremity of the image in the right eye is inclined to the right side.

There is, then, in this case paralysis of all the muscles in the left eye supplied by the third nerve except the inferior oblique, and in the right eye paralysis of the inferior oblique alone—*i. e.*, paralysis of one complete set of muscles supplied by the third nerve, but distributed in a particular way between the two eyes.

Therefore, to Starr's* conclusion, that " if all the muscles of the eyeball supplied by the third nerve are affected, including the iris, the case is one of total peripheral paralysis of the third nerve, and the lesion lies on the base of the brain," I would add the following, "but if all the muscles of one eye supplied by the third nerve are affected, except the inferior oblique, with paralysis of the inferior oblique alone of the opposite eye, the case is one of total unilateral nuclear paralysis of the third nerve, and the lesion lies on the same side as the eye in which the inferior oblique is not affected and on the opposite side to the eye in which the inferior oblique is alone affected."

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* M. Allen Starr. Journal of Nervous and Mental Disease, May, 1888.

In considering the above case it would be logical to conclude that if there had been a paralysis of the right inferior oblique, which is an elevator, the right eye would have been lower than the left one, for in the left eye one depressor and one elevator is said to have been paralyzed, so this eye suffers no vertical displacement. Therefore, the image of the left eye would have been lower and not higher than the image of the right eye as stated, for it is a cardinal law that the higher eye always projects the lower image. Further, the statement made that "in a paralysis of the inferior oblique muscle the upper extremity of the false image is inclined toward the affected side," is very true; but this is of diagnostic value only when the position of the image of the other eye is considered, for a paralysis of the inferior rectus could also cause a tilting of the image toward the affected side, and, indeed, with a vertical displacement similar to that described in the above case. This, however, could not have been the condition here, because the distance between the images would not have increased when the test object was moved upward.

According to the laws of physiology as applied to the paralyses of the ocular muscles, it is very evident that but one form of paralysis could have caused the double images as described in the case under consideration. When fixing with the paralyzed eye in the examination for double images, a paralysis of the third nerve seemed to be indicated, because the excesssve impulse which was sent from the inferior oblique of the paralyzed eye, caused a secondary rotary displacement of the normal eye.

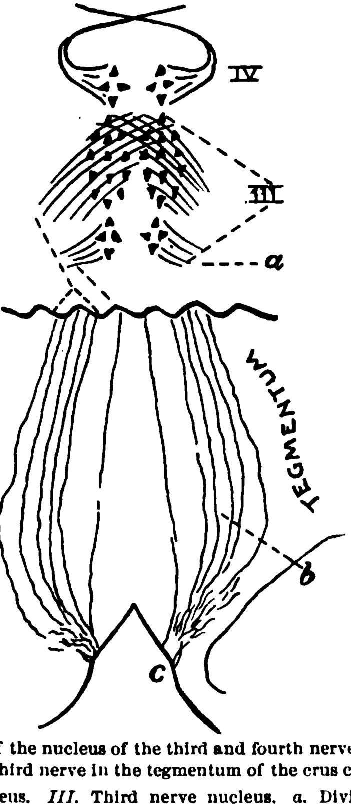
This secondary rotation of the normal eye could have been brought about by an excessive contraction of its superior rectus, which would simulate a paralysis of the inferior oblique of the same eye—that is, if the position of the other eye were not considered.

In short, it may be said that our knowledge of the decussating of the root fibres of the motor ocular thus far derived from clinical and anatomical study is of diagnostic value only in consequence of the fact that it increases the tendency to binocular paralysis in nuclear lesions, but that this decussating causes characteristic combinations has not as yet been demonstrated.

Probably the most common and certainly the most characteristic form of nuclear paralysis is that in which some or all of the external ocular muscles of both eyes are affected (the sphincters of the irides and ciliary muscles escaping).

If all the external muscles of both eyes are affected and the internal muscles are active, the condition is known as total binocular external ophthalmoplegia. Swanzy[15] considers a total external monocular ophthalmoplegia as one of the forms of nuclear palsy. He also states that a nuclear palsy may be monocular and involve all the branches of the third nerve—the fourth and sixth escaping. These views are by no means confined to the above author, for most of the authors that express themselves on the subject are of a like opinion.

FIG. 1.



Schematic drawing of the nucleus of the third and fourth nerves and the root fibres of the third nerve in the tegmentum of the crus cerebri.

IV. Fourth nerve nucleus. *III.* Third nerve nucleus. *a.* Division of the third nerve nucleus for the internal ocular muscles. *b.* Root fibres of the third nerve. *c.* Exit of the third nerve.

If the anatomy of the nucleus of the motor oculi as described by Kolliker and Bach be accepted, this form of paralysis would be impossible. The decussating fibres as described by these distinguished authors do not pass directly downward from their cell origin, but, first, in an arched course pass between the cells of the opposite side, to descend here as the most lateral of the root fibres. Thus a lesion situated in the distal part of the nucleus of the motor oculi of one side would of necessity implicate these intermingling fibres which have crossed over from the opposite side. Further, it can be said that in no case has an autopsy demonstrated that a nuclear lesion can involve all or even the majority of the muscles of one eye governed by the third nerve without affecting the muscles of the other eye, while, on the other hand, time and time again have cases which according to the text-books would be most characteristic of nuclear paralysis been found to be due to lesions on the base of the brain.

Moreover, I would say that the diagnosis of nuclear palsy must be made with reserve in all cases of even partial monocular ophthalmoplegia.

The muscles of the motor oculi most likely to be affected in a case of monocular ophthalmoplegia are the internal ocular and the levator palpebræ muscles. The paralysis of these muscles, however—that is, the conditions known as mydriasis and ptosis—are of little diagnostic value in determining either the nature or seat of a lesion in intracranial disease.

Another case from which deductions have been made in locating lesions affecting the ocular muscles is the well-known case of Allen Starr,[16] of partial external ophthalmoplegia of both eyes due to embolism in the tegmentum.

S. D., a Frenchman, aged fifty-six years, a painter by occupation, and a resident of Providence R. I., was brought to my clinic April 18, 1887. He had been a healthy man all his life, with the exception of occasional attacks of rheumatism and frequent attacks of migraine. He had never contracted syphilis, and denied all symptoms of pulmonary, cardiac, gastro-intestinal, and renal disease, although a physical examination revealed the existence of slight aortic obstruction producing a systolic murmur heard at the base and associated with slight ventricular hypertrophy.

He stated that about April 1, 1887, he had been seized very suddenly with double vision and vertigo, objects appearing to move up and down constantly, so that he was much bewildered and unable to stand or to walk alone. He managed with help to reach his home, but has no recollection of what occurred during the three following days, during which, according to the statement of his family, he lay in a somnolent condition, but not comatose or paralyzed. He was then able to get up, but felt stupid, dizzy, and walked with difficulty, it being impossible for him to fix any object with his eyes, all objects being seen double and in motion. These symptoms have improved slightly, but he still feels weak, has vertigo and double vision. He has never had headache, nor has he felt any sensation of numbness or cold or pain in his body, and he has had no paralysis, tremor, or spasm.

Examination shows a well-nourished, intelligent, active man, whose facial expression is rendered peculiar by the position of his eyes. When at rest they diverge slightly, and the right eye is turned upward, and the right pupil is slightly larger than the left. When the eyes are moved it becomes apparent that the motion is defective. The eyes can be turned from side to side together perfectly, but such motion soon produces lateral nystagmus of the right eye. They cannot be converged to an object nearer than two feet, because of slight weakness of the right internal rectus muscle. They cannot be turned downward below the horizontal line either together or when tested separately. When asked to look up the right eye follows the object above the horizontal line, but the left eye does not. Both eyes, however, turn up and in, though this motion produces rotary nystagmus. The reaction of the pupils to light and in accommodation is prompt, though the right pupil contracts in accommodation more slowly and less completely than the other, and remains slightly larger. Tests by secondary deviation and double images confirm the conclusion reached by this examination, viz., that in the right eye there is paralysis of the inferior rectus and paresis of the internal rectus, and that in the left eye there is paralysis of the inferior rectus and superior rectus. There is no ptosis. There is no paralysis of the oblique muscles or of the external recti. One week later the paresis of the right internal rectus, the difficulty in convergence, and the difference in the size of the pupils had disappeared, but all the other conditions remained, and they have persisted until the present time (April, 1888). He is still suffering from general weakness, vertigo, and double vision, although the latter symptom no longer troubles him excepting when he attempts to draw lines in painting, when he finds that he does not draw accurately, and hence has had to give up his work. He often staggers in walking, but this is due to vertigo and not to ataxia, and it is not constant. He walks as well with eyes closed as with them open. Attempts to turn the eyes up or down, or upward or inward, produce nystagmus of a rotary kind, more marked in the right eye, and this always makes him dizzy. He has developed no further symptoms, is not paralyzed, has equal and normal tendon reflexes, and has no loss of sensation, vision, or hearing. The diagnosis made is embolism, from the aortic valve, in the small arteries entering the posterior perforated space between the crura cerebri, and resulting in one or more small foci of softening in the tegmentum cruris.

This diagnosis can be reached by exclusion, for it is impossible for the symptoms to have been caused by a tumor or a meningitis upon the base of the brain in the course of the third nerves. Such a lesion would not have come suddenly or have remained stationary, and would have involved the nerve as a whole, impairing all its functions and not affecting merely a part. Nor have we here a condition of acute inflammation with hemorrhage in the floor of the aqueduct of Sylvius,* nor such a condition as occurs in a true ophthalmoplegia externa, for there is no tendency manifest toward an extension of the symptoms, or to complete immobility of the eyes.

It is true that a hemorrhage in the same region is with difficulty distinguished from an embolism, but in hemorrhage some evidence of pressure upon the adjacent sensory or motor tracts is usually shown by unilateral symptoms which have been wanting here, and here there is a roughened aortic valve to give rise to an embolus. The nature of the lesion is, therefore, easily determined.

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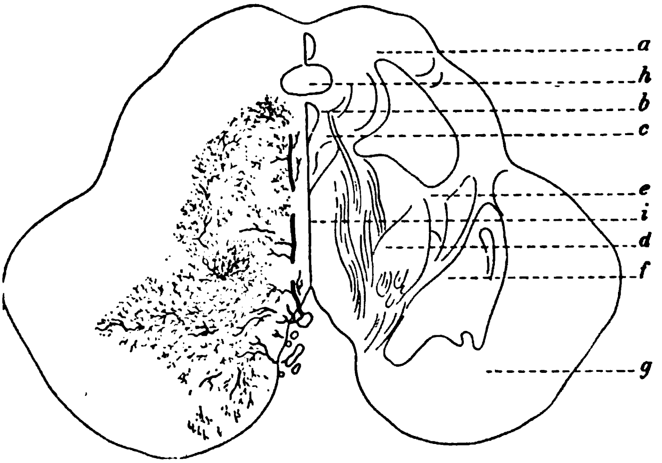
* Polioencephalitis of Wernicke.

In diagnosing a tegmental lesion involving the muscles of both eyes there must be assurance that an artery exists which has its distribution in the root fibres of both motor oculi. The question is, Does such a vessel exist?

The conclusion arrived at by Shimamura[17] in his experiments would certainly indicate that no such vessel could be found. The accompanying illustration, taken from Shimamura, shows the isolated blood-supply of the root fibres of each motor oculi, arrived at by injecting colored fluid into the vessels which leave the posterior cerebral artery just to the right of the bifurcation of the basilar artery. This author says the injected median vessel area has about the form of a triangle with its base directed toward the crusta, its apex toward the aqueduct of Sylvius—that is to say, the ventrical plane is broadened and becomes smaller as it approaches the aqueduct of Sylvius. Whether anastomosis exists between the vessels of one and the other side could not be demonstrated with indubitable certainty.

FIG. 2.



Section through the crus cerebri and the anterior corpora quadrigemina. (After SHIMAMURA.)

a. Nucleus corporis quadrigemini. *b*. Regio nuclei nervi oculomoterii. *c*. Fasciculus longitudinalis post. *d*. Nucleus ruber. *e*. Lemniscus. *f*. Substantia nigra Sömmeringii. *g*. Crus cerebri. *h*. Aquæductus Sylvii. *i*. Median bloodvessels.

The demonstration that, in spite of the ligation of all the vessels of one side and injecting through the vessels of the other side, single vessels of the same side as that of the ligated vessels were still found injected, could indicate that an anastomosis existed between the two median regions; but the fact that in no specimen was there a single anastomosis of this nature to be seen makes it probable that in the depth of the trigonum intercrural very fine communicating branches of vessels exist between the one and the other side, and that through these fine connecting vessels injected fluid from the median vessels of one side makes its way into the vessels of the other side, but in the crus cerebri itself no anastomosis exists between the two vascular regions, for if so it certainly would have been seen in some one of the many specimens, which, however, was never the case.

Undoubtedly though it was also shown here, and indeed with particular clearness, that a vascular communication could not be demonstrated between the median and lateral areas on the one hand and between the dorsal area on the other hand, therefore the vessels situated along the median line represent an independent and isolated blood-supply.

Hence the fact that the root fibres of the third nerve in the tegmentum of the crus cerebri, as well as the bloodvessels in this region, are confined to their respective sides, make the monocular paralysis characteristic of lesions in the tegmentum.

Therefore, in regard to the case just related, of binocular ophthalmoplegia, in which the diagnosis was made of one or more foci of softening in the tegmentum, I would say that a single focus of softening resulting from an embolus in one of the small arteries in this region could not affect the fibres of both motor oculi in the manner described. Two foci of softening, one on either side of the median line, resulting from the plugging of two distinct arteries, could cause this form of paralysis, still one would be scarcely justified in considering a case in formulating rules which required a diagnosis so broad as one or more foci of softening.

The fact that the muscles of both eyes were affected, together with the absence of hemiplegia or hemianæsthesia, would, I think, make it far more probable that the lesion was in the nucleus of the third nerve.

Therefore, I would modify the conclusion of Starr in which he says: "If one or two of the muscles of the eyeball supplied by the third nerve are affected, others escaping, the lesion lies in the tegmentum of the crus cerebri between the nuclei of origin and the point of exit of the third nerve, one eye or both may be affected; but both eyes are rarely affected in the same manner." He makes one exception to the above conclusions, and that is in the case of a post-diphtheritic ocular paralysis.

I would say in a case of monocular ophthalmoplegia with a sudden onset affecting any of the muscles which move the eyeball supplied by this third nerve, others escaping, the lesion lies in the tegmentum of the crus cerebri.

In a case of binocular paralysis of this form with a sudden onset the lesion lies in the nucleus of the third nerve on the floor of the aqueduct of Sylvius.

These rules are also applicable to a very great extent in cases with a chronic onset. However, lesions on the base of the brain or in the orbit implicating some of the fibres of the third nerve may in rare instances cause similar forms of paralysis. This is especially the case in syphilitic disease of the base of the brain, where gummatous exudations may involve but a part of the fibres of one or even both motor oculi.

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A CONSIDERATION OF CERTAIN DETAILS IN THE MANAGEMENT OF THE PREGNANT AND PUERPERAL PATIENT.

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THE following paper is presented in the hope that the plan of treatment as outlined may be found acceptable by the general practitioner, who is really the accoucheur of the world.

It is an unfortunate fact that among the laity the idea is so prevalent that pregnancy and delivery are simply physiological states and acts. That they are such in many cases is most fortunately true, but this does not make it the less true that the realm of pathology may easily be invaded. Still more unfortunate is it that in the profession are still to be found many men who view the pregnant woman and even the woman in labor with less solicitude than the ordinary breeder views his animals. Some may very likely deny this last statement, but I ask, How many men are accustomed to make a routine examination of the pelvis or of the urine during pregnancy? In how many cases is the heart regularly examined? How often is the position of the child determined before the actual onset of labor? It might well be asked, How often is this last point ever determined?

Now, while it has been fortunately ordained that women will, in the majority of cases, deliver themselves spontaneously, it is not the less true that in many cases art can assist nature not only in lessening the duration of suffering, but saving the woman possible serious injury if the above questions, with others, have been answered correctly.

With the idea that the need of more careful study of the seemingly normal case should be emphasized, this paper has been prepared. It will be noted that the attempt is not made to present a complete account of the technique of delivery, only such points being discussed as have seemed to me to be the ones most often neglected.

First of all, it is earnestly to be desired that more attention be paid to the period of gestation, and that as soon as possible after the diagnosis of pregnancy has been made the urine should be examined for the presence of albumin and sugar, and that the heart and lungs should also be examined. With regard to the urine, it is the custom of many men to attach great importance to the estimation of urea under a mistaken idea of its importance. This substance is so greatly influenced by dietary changes that its estimation is, in the usual case, of very doubtful value. The importance of the re-examination of the urine at regular intervals during the pregnancy must also be urged. The peculiar hazard which a case of pregnancy runs if there be cardiac or pulmonary complications needs only to be remembered to show the importance of the routine examination of these organs.

General advice should also be given to the patient regarding diet, exercise, and personal hygiene. The diet should be nourishing and simple, and if the appetite be ravenous it should be restrained; while if, as sometimes happens, the reverse is true, it should be stimulated and nutrition kept up by milk or concentrated foods. The daily bath may, of course, be taken, though it is well to caution against the cold plunge. The question of exercise is the one upon which the opinion of the doctor is most frequently desired. It may be said that the more severe forms should be avoided, such, for instance, as the bicycle, horseback riding, sea-bathing, etc.; but, on the other hand, care should be taken to combat the unfortunate tendency exhibited by some women to forego all exercise during the latter months because of mistaken ideas of modesty.

The natural constipation of the pregnant woman should be combated by the use of the milder laxatives, such as cascara sagrada or the pill of aloin, belladonna, and strychnine. The use of salts and castor oil had better be interdicted.

About two months before the expected date of confinement an estimation of the size of the pelvic inlet should be made. This, a bugbear to many, is in reality an exceedingly simple procedure, only requiring a small amount of practice to enable anyone to gain sufficient experience for all practical purposes. It is well to remember, however, that the method in all its details, as laid down in text-books, while valuable for statistical purposes and perfectly possible in hospital practice, will often in private be found impossible of execution by those whose experience has not been sufficiently great, as, unless one is more or less expert, an unpleasant degree of exposure is essential to the gaining of any reliable data.

The complete determination of the pelvic diameters is, moreover, of little importance in the usual case, as if the inlet be found to be serviceable, the pelvis, as a whole, may be so regarded. The estimation of the inlet is, on the other hand, of the greatest import both as an aid to prognosis and proper treatment. Its estimation is simplicity itself. It will be remembered that the antero-posterior diameter of the inlet of the pelvis extends between the promontory of the sacrum and the posterior surface of the symphysis pubis, the point on the symphysis where this imaginary line impinges being just below its upper border. As any direct estimation of the distance between these two points is impossible, because of the height of the symphysis, it is necessary that some indirect method of estimation be employed. By the study of many pelves it was found that by measuring the length of the diagonal conjugate (the imaginary line between the under edge of the symphysis pubis and the upper edge of the promontory), and subtracting from it a determined factor, which would represent the height and angle of the symphysis, a result could be obtained which would be sufficient for all practical purposes. In order to obtain this diagonal conjugate, the woman, with all constricting clothing removed, is brought to the side of the bed or table, lying in the modified lithotomy position, and the index and middle fingers of the hand are carried into the vagina in an upward and backward direction until the promontory of the sacrum is felt. Its most prominent point having been selected, the point upon which the under edge of the symphysis impinges is marked on the index finger, and the distance between the end of the middle finger and the point just determined is measured. This gives the dimension of the diagonal, from which the true conjugate is to be deduced by computation—that is, by subtracting the factor 2 cm., which will cover the excess of the diagonal over the true conjugate in the majority of cases. It is to be remembered that this excess is occasioned by the fact that the surfaces of the symphysis and sacrum are not parallel, and also that the symphysis measures vertically about 4 cm. on the average. While the promontory of the sacrum can be reached in every case, provided the pelvis is not oversized, it will be found that in normal pelves the attempt will often occasion the woman considerable pain, due to the pressure exerted on the buttocks by the ring and little fingers.

By having previously determined the point on the index finger corresponding to a distance of 12¾ cm. from the end of the middle finger it can at once be determined what relation the pelvis under examination bears to the normal without recourse to a pelvimeter. By having this point on the index finger definitely remembered there will be no need to give the normal case the pain spoken of above, as it will at once be seen that the edge of the symphysis approaches very closely to the point on the index finger previously determined without, perhaps, feeling the promontory at all. It must be remembered, however, that there is one caution to be exercised, namely, that the direction in which the fingers are introduced must be upward as well as backward, as, if this precaution is disregarded, it may easily happen that the distance between the symphysis and the hollow of the sacrum will be estimated—a distance which, of course, bears no relation to the inlet. To avoid such an error it is well to always feel for the ileopectineal lines, and by their convergence of direction determine the position of the promontory. If this be done, and the hand is introduced into the vagina until the edge of the symphysis approximates to the determined point on the index finger, the pelvis may be safely looked upon as normal, even though the actual bony prominence of the sacral promontory be not felt.

The next important duty after the estimation of the pelvis is to determine the position of the child. If it be found that it is presenting by the breech, or that a hand or footling presentation is present, it is well to do an external version, attempting the maintenance of this corrected position by the use of pads and a binder. Unfortunately, however, this change of posture cannot be, as a rule, preserved for any length of time, and so the real value of this determination of fœtal posture is that the patient may be impressed with the importance of notifying the physician as soon as the first labor pains are felt, in order that any interference may be practised at the proper time.

Within the definition of "normal cases" may be properly considered women whose pelves on examination are found to be a little less than normal, and also those cases of labor in which there is a retardation of the head in the cavity of the pelvis.

Considering the first of these questions—that of the slight pelvic contractions—it is found that of late years there has been a too frequent tendency to resort to the induction of premature labor to meet the indication presented by this slight abnormality. The excuse given was that at least no harm could result, and that it was better to ensure an easier labor to the mother rather than, by allowing her to go to term, to be compelled to resort to the forceps for the delivery. Any considerable number of cases will, however, show a certain percentage of infantile mortality, not to speak of the decided possibility of the occurrence of maternal mortality or morbidity from septic infection. While simply a repetition of well-known facts, it is interesting to note a few results bearing on this point as obtained at the Maternity Hospital. In this institution the patients are required to enter the house at least three weeks before labor, in order to minimize as far as possible the chance-error in the estimated date of confinement, and also to gain control of the case, with the idea of establishing an improved personal hygiene. Entirely aside from these important considerations, adherence to this rule has emphasized the following facts as derived from a study of statistics: First, it is found that the children of women who have been in the institution for a period of three weeks or more weigh at birth 20 grammes more, on an average, than do those children whose mothers have either been received in labor or who have entered but a day or two before its onset. Second, it has also been found that among the twenty-one deaths which have occurred among the infants delivered during the last seven years there were seventeen whose mothers had been in the house on an average but two days. These two facts speak strongly of the important part which the last month of pregnancy plays in the welfare of the child, and should be remembered by those more enthusiastic advocates of premature labor who would advise this operative procedure as a means to meet the slight forms of pelvic deformity.

That the induction of premature labor is a therapeutic measure, whose efficacy cannot be overestimated in the properly selected case, is a fact that no one will question; but, as has been said, there is no doubt that its aid is invoked quite often without there being any real indication for it. The opinion of the writer is that it is best, at least in the case of a primipara, in the presence of slight pelvic contractions, to be very cautious in advising that premature labor be induced; and, all things considered, to look forward in the majority of cases to a more difficult labor at term rather than to jeopardize the welfare of the child in order to ensure an easier labor for the mother. This, of course, does not refer to the cases of pelvic deformity of such a grade that there is well-founded fear that a major operation will be necessary if the case be allowed to go to term, but, as has been said, to the smaller degrees of deformity—such, for instance, as presented by the simple flat pelvis with a diagonal conjugate of 10 cm. It is hardly necessary to state that these restrictions in the induction of premature labor have no bearing on the advisability of the termination of a pregnancy in which the onset of labor has been deferred for a considerable period. In hospital work, however, this indication for the induction of labor can but rarely be met, as the histories of the patients are so often so very vague that no dependence can be placed upon them.

Regarding the use of forceps in the type of case mentioned above—namely, that of a head retarded in the pelvic cavity—it may be said that while there is no question that their use simply as a convenience to the doctor is reprehensible and to be strenuously condemned, it is, on the other hand, true that their province is not as narrow as some hold—*i. e.*, simply to deliver a head after nature has confessed her inability to deliver spontaneously; but that in cases in which the head is retarded in the pelvic cavity, with commencing vaginal œdema, their use is demanded by the best interests of the case, even though there is no doubt that ultimately delivery would be effected by nature unaided. In such a case their province is to save the mother from the continuance of non-effectual pains and also to minimize the dangers from septic absorption, which in the presence of vaginal œdema are greatly increased. It may also be said that the timely use of forceps will, instead of causing pelvic floor lacerations, subserve the opposite end—that of prevention. It is necessary to be very definite, lest the idea be given that, in the writer's opinion, there is frequent need for the application of forceps in the normal case. Such is by no means his view, but it is nevertheless true that much suffering can be avoided by the proper use of these instruments, both through prevention of the long continuance of useless suffering and also by avoidance of prolonged pressure on the pelvic structures, which tends to the production of the very condition which the opponents of the forceps declare is caused by their application—namely, pelvic lacerations.

In the preparation of the patient for labor there are certain procedures which, if observed, will render her much more comfortable than would otherwise be the case, beside minimizing the dangers of subsequent infection and the difficulties encountered by those in charge of the delivery. The most important among these is the full tub-bath, the patient being cautioned to pay particular attention to the external genitalia by scrubbing the area covered by the pubic hair most carefully with soap and water. She should also take a soap-and-water enema, in order to avoid the soiling of the perineum by fecal matter during labor, with the attendant danger of infection of any tears that may occur, and also to prevent retardation of the birth by impaction of feces. The shaving of the pubes, while the custom in many maternity hospitals and in such institutions a procedure of great value, would be strenuously objected to among the better class of patients, and among such it is unnecessary.

The comfort of the patient and physician will also be enhanced if the ordinary clothing be removed by the middle of the first stage, the night-dress and stockings being substituted, with the addition of a wrapper or skirt as long as the patient is on her feet.

The most important phase of this whole subject, however, is, as all will agree, the consideration of the best means of conducting a labor under aseptic precautions. That the consideration of this subject is not, as some might suppose, an exhausted field, will be realized if the current medical literature be consulted. Indeed, a most remarkable amount of uncertainty will be disclosed as to the best methods of applying the principles of the aseptic technique to the processes of parturition and the puerperium. In the institution with which the writer is connected the results obtained are most satisfactory in this respect, there having been since the foundation of the house a septic mortality of but eleven cases among a series of 2633 confinements, while since the year 1889 there has been no death from sepsis. In this last period there have been 1324 deliveries. Such a record is certainly proof that the method by which it was maintained is worth the consideration of men doing this class of work. It is particularly to be remembered that this is the record of a hospital, and as such is especially good, as in the series of cases there were many emergency births in which no attempt could possibly be made to prepare the patient in any but the most hurried manner.

During the last few years there has been an attempt on the part of some men to shift the blame attached to a septic case by attempting to explain its occurrence on the ground of an auto-infection. That this is a specious attempt is shown by the rarity of the true case of infection, which can scientifically be referred for its causation to previously existent septic foci in the body. Fehling[1] has recently called attention to the folly of considering cases of retention of placental fragments or gonorrhœa as true cases of auto-infection, and states that in his experience such cases as can truthfully be looked upon as instances of auto-infection are very rare, and that in the vast majority of infections the cause will be found in a failure of some portion of the technique. This is the foundation upon which all successful work in obstetrics must be based, and if it is thoroughly grasped will result in the development of the aseptic conscience. This, then, is the main fact to be remembered—that sepsis occurring in a case of labor always places the attendants on trial until their innocence can be proved. As a result of a firm belief in this proposition, there are certain results which follow with reference to the method of treatment of the woman during the period of delivery and also during the puerperium. The preparation of the patient has already been described, and it only remains to emphasize one thing more, namely—that believing that all sepsis, speaking generally, is derived from without, all interference with the genital tract before labor by the use of douches or by frequent examinations is prejudicial to the case. With regard to the inadvisability of frequent examinations, it has been clearly shown that morbidity at least bears a direct proportion to the number made. With respect to the use of the douche, it is to be remembered that not only is the danger present that infection may result directly from the introduction of a douche nozzle, but that a much greater evil arises in all cases in which its use is countenanced by the destruction of those normal bacilli of the vagina whose province it is to act as phagocytes, and thus to guard against the invasion by any chance infection from without. Moreover, there is no reason in the normal case to wash out the vagina, as there are no germs of a virulent nature resident within it; while if there be a pathological condition present the douche alone will not be sufficient to remove the offending germs. To meet this indication, which is most frequently supplied by a gonorrhœa, it is necessary to scrub out the vagina thoroughly with green soap before using the douche. The same is true of the douche after labor, except that its routine use is more dangerous at this time even than when used before the birth of the child. It seems hardly necessary to emphasize the necessity of the greatest care regarding the boiling of all water which is used about the patient, or that the bed-clothing should be as nearly surgically clean as possible. In hospitals the "as possible" must be omitted, and an absolute degree of sterility be insisted on, as not only is such surgical cleanliness perfectly possible, but the dangers of infection are much greater in institutions than in private work, no matter what unsanitary conditions are present in the home of the private case. Realizing the great importance of the matter, the Maternity Hospital enforces the most careful supervision over the mattresses and bedding used in the wards set apart as delivery-rooms. In order that those not connected with institutions of this character may realize the importance which experience attaches to this matter, a short résumé of the rules in force in the institution is here given:

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[1] Münchener med. Wochenschrift, November 27, 1900.

It is necessary to mention, in the first place, that there is nothing in any of the wards which cannot be removed, as stationary wash-stands, etc., and that each ward is only used for four confinements in succession. After the fourth case has been transferred to the convalescent ward at the end of her two weeks, the ward is closed and cleaned. This cleansing is a very careful process, and consists in a twenty-four hours' airing after stripping, the blankets and other bedding being sent to the laundry. The ward is then fumigated with formalin and scrubbed with soap and water and bichloride, and the beds are washed with turpentine and carbolic acid. At the completion of this process the ward is closed for a period of twenty-four hours before being made up anew. The bedding sent to the laundry is boiled and afterward soaked in a solution of bichloride of mercury of the strength of 1 : 4000. While as near an approach to these rules as may be possible is most desirable in private, it is, of course, often out of the question to in any way control these matters, and, fortunately, the need in the usual run of cases is not great, as if care be taken not to directly infect the case by the use of dirty instruments or fingers the woman will suffer no inconvenience, even though the conditions are very unpromising as far as bedlinen, etc., are concerned. There is, on the other hand, of course, just as much danger of infection occurring in the private case as in the case of the woman confined in an institution, if the hands or instruments used are unsterile. As regards the instruments, the slightest knowledge of the requirements of modern asepsis will enable this danger to be avoided; but the preparation of the hands is a very different matter. It is to be remembered that complete sterilization in the true surgical sense is at present an impossibility, and the claim of Ahlfeld, that after a careful scrubbing in hot water and alcohol the performance of surgical procedures is without danger, is best looked upon with decided misgiving. It is a much safer stand to assume that if, during the previous two days, the hands have been exposed to the virulent organisms of infection, they cannot be rendered safe to introduce into the vagina. While, of course, this time-limit is artificial, and while also the danger is greatly influenced by the condition of virulence of the particular infection, it is nevertheless a much safer rule to follow than to trust in the efficacy of attempted sterilization.

Exigencies of practice, however, prevent the complete avoidance of hand contamination from all infective agencies, and, therefore, unless some substitute be possible of proposition, the caution just given would be wellnigh useless. Fortunately there is at the present time a perfect means whereby the hand may be rendered absolutely sterile, even though it has been but just removed from a virulent case of infection. This is accomplished by the use of the rubber glove, a means which is of particular importance to the general practitioner, liable as he is to infection many times during the course of his daily work and generally untrained in the details of surgical cleansing of the hands. In the hospital work and private practice of the writer the use of rubber gloves is resorted to whenever there is reason to mistrust the condition of the hands, as by so doing a sense of security is realized impossible by any other means, no matter how carefully the attempted cleansing may have been carried out. It is, however, to be remembered that the use of the glove is to be considered only as an additional safeguard and not as a substitute for hand cleansing. This may seem paradoxical at first sight, but a moment's thought will explain the reason for this statement, since the rubber is so thin that tears may occur at any time during use, and also as one of the effects of the glove is to soften the superficial layers of the skin, thus permitting the germs which may have penetrated deeply to be easily deposited upon any surface with which the hand may come in contact; therefore, the bare hand must never be substituted for the glove except in the case of the most absolute necessity, and then only after the most careful re-sterilization of the hand. The best method for the sterilization of the hands is the scrubbing in several changes of hot water for a period of at least ten minutes, followed by the use of benzine, alcohol, and bichloride of mercury, or by potassium permanganate, oxalic acid, and bichloride. It is to be borne in mind that the most important part of the process is not the use of the chemical germicides, but the scrubbing in hot water, and that the nail borders and the folds of skin between the fingers and around the joints are the hardest to cleanse and also the most usual sites of germ lodgement. So important is the use of gloves, and so greatly is the safety of the patient enhanced thereby, that there is but little doubt that claims for malpractice would be granted by a jury if it were proved that a delivery was effected without their use by a physician whose personal sterilization was rendered questionable because of immediate previous attendance upon a septic case. Before leaving the subject it will be well to mention another claim presented by the gloves, namely, their use to protect the finger introduced into the rectum in order to cause extension of the head at the outlet of the pelvis. This procedure, while not at all necessary in the majority of cases, is a manœuvre of great value at times, as by its use greater control may be exercised over the head than by the forceps in this terminal stage, thus avoiding the lacerations which so often follow the complete instrumental delivery. As at any moment after the delivery some intra-uterine manipulation may be demanded, it can readily be seen how serviceable any impervious covering will be.

Aside from the question of asepsis, the most important question in the after-treatment of the case is how best to aid nature in restoring the various portions of the genital tract to a condition of involution. In a word, this result is to be secured by the repair of all lacerations of the perineum and by the insistence upon a sufficient period of rest in bed after delivery. While this answer seems simple enough theoretically, the numberless cases which year by year apply to the clinics bear testimony, not always silent, that either the importance of the immediate repair of lacerations of the pelvic floor and the proper period of rest are not understood or that their performance is faulty. As regards lacerations of the soft parts, there can be no question in anyone's mind that the severe grades, such as tears involving the sphincter muscle, demand immediate repair; and it is a fortunate thing that, as a rule, if infection be avoided the result will be satisfactory, healing being perfect. Even at this day, however, the attention of the general practitioner needs to be directed to the evils resulting from neglecting the repair of the much more common tears of the sulci or external perineum. It cannot be too strongly insisted upon that all tears, without regard to position or extent, should be repaired within twenty-four hours after labor, with the exception of lacerations of the cervix. While in the case of the small external lacerations this procedure is to be advised on the ground only of the avoidance of a certain percentage of morbidity from local septic absorption, in the tears involving the sulci there is a very important additional reason, since the persistence of a laceration tends to the production of a condition of subinvolution of the vagina, with a possible uterine participance, and, secondarily, a condition of loss of support, with its consequent difficulties.

It is therefore most strenuously to be urged that an examination, by sight and touch, be made immediately after every delivery, to determine the condition of the soft parts, and that if any lesion be found an immediate repair be done. As has been said, the cervical lacerations are not included as coming under this rule, it being better not to attempt their repair, save in the event of severe hemorrhage, because of the danger of infection and also because of the probable failure of the operation. The best method, in the writer's opinion, by which to repair perineal tears is the operation devised by Emmet. Of course, the classical form of operation can often not be done, as the denudation is not made according to any fixed rule; but the principles of the operation can be followed, each sulcus being separately repaired and a crown suture being inserted to complete the posterior commissure. It is a point well worth remembering that it is not necessary to include a large amount of tissue in the sutures, as there is no retraction of the muscular parts, and also that it is necessary to exercise caution, lest too great tension be caused by a too tight application of the stitches. Care is, however, necessary as regards the depth to which the needle is carried, as unless the bottom of the laceration is reached and picked up by the suture a dead space will be left, which at this time will become the resting-place of culture media of the highest efficacy.

With regard to the time to be advised during which the patient should remain in bed after delivery, it is to be remembered that no one period can be considered as applicable to all cases, but that each case should be studied as a unit. The writer's plan in hospital and private practice is as follows: After delivery all normal cases are kept in bed for a period of twelve days, and if at the end of that time the uterus does not show a degree of involution sufficient to warrant leaving the bed, the period of rest is continued, and hot douches and strychnine are ordered.

During the first forty-eight hours after delivery the patient is kept lying upon her back, but after that time has elapsed she is encouraged to turn from one to the other side and to spend a portion of the day lying upon her face and abdomen. This change of posture thus early in the puerperal period is a recent modification, and the number of cases observed since it has been established is too small to enable any definite conclusions to be drawn; but the experience so far accords with that of

Beckers,[1] who advocates this early variation of posture as an aid to involution and flow of lochia, and particularly to avoid the occurrence of retrodisplacements of the uterus.

Without question, one of the duties most frequently neglected by the practitioner in charge of an obstetrical case is the examination at the completion of his attendance. That the importance of such an examination, made at the time the patient leaves her bed, is not understood by many physicians is a fact to be deplored, as so much can be done at this time to combat any evils resulting from the just completed gestation. It should be an invariable rule to examine every case at the end of two weeks, in order to determine the existence of any lacerations of the cervix or perineum, and also to satisfy one's self that the uterus is in its normal position and that involution is progressing satisfactorily. The method followed by the writer is to examine every case at the time mentioned, and if any backward malposition of the uterus be found it is corrected and a pessary is inserted, the woman being instructed to return in a short time—a few days at most—in order that immediate dangers of the instrument may be avoided, and later on, that the size of the supporter may be decreased, to avoid interfering with the normal involution of the vagina. It is, of course, unnecessary to state that the position of the uterus should be corrected before the application of any mechanical support. This is, as a rule, easy, provided that the retrodisplacement has been the result of the just completed pregnancy. While the writer is most strong in his belief as to the importance of this examination, and while he believes that one of the causes most frequently operative in the production of retrodisplacements of the womb is pregnancy, and, moreover, that the sooner this malposition be corrected the better from the curative stand-point, he has never felt it wise to follow the rather radical methods of some of the more recent writers on the subject, among whom may be mentioned Ahlfeld, Fritsch, and Rissman,[2] who advise that an examination be made and a pessary inserted, if needed, at the end of the first week. It has seemed that there will still be dangers of possible infection at this early date, and that although the lacerations are, as stated by the authors mentioned, in the stage of granulation at this time, that satisfactory union may be endangered by this early application of the pessary. In the light of the experience acquired since the change of posture during the lying-in period has been adopted, this early examination would seem also a useless and meddlesome procedure, as almost every case will be found at the final examination to present a uterus in good position if the directed change in posture has been faithfully carried out. Of course, this is only intended to apply to the cases in whom the retrodisplacement is the result of the just completed pregnancy. In certain cases of old, backward displacements, good may, in the opinion of many, be accomplished by the use of the pessary; and, while it would seem that the earlier the application the better the results, the dangers noted above render it ill-advised to attempt this early application even here. It is probable that, if the uterus be possible of replacement, the faithful use of the knee-chest posture, together with the change from the dorsal position to the modified Sims, will accomplish as much in aiding the involution of the uterine ligaments, where this is at all possible, as will the use of the pessary during the first few days after delivery. Of course, the pessary should always be inserted, as well in old cases of retrodisplacement as in the recent, at a suitable time, which, in the opinion of the writer, is at the end of the period of bed-rest, which may, as a rule, be stated to be the twelfth day.

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[1] Münchener med. Wochenschrift, August 21, 1900.

[2] Ibid., March 6, 1900.

In closing it will be well to call the attention of the practitioner to the importance of personally overseeing the application of the pad and binder. As regards the latter, there is no doubt that it subserves a useful purpose in supporting the stretched abdominal muscles, and often aids in the obliteration of the separation so often noted between the recti muscles. In addition, it certainly adds greatly to the comfort of the woman if applied correctly. It should extend from the edge of the ribs to the trochanters, and should be kept smooth, the nurse being compelled to see that its proper position is maintained. This can be best done by making side tucks and pinning the vaginal occlusive dressing to its lower margin, both front and back. The abdominal pad—made by folding a towel of ordinary size until it measures about six inches square—must be applied properly, or its object will not only be defeated, but actual harm will result in a certain proportion of cases by causing a tendency to backward displacements of the uterus. It is to be remembered that the uninstructed nurse will, if left to herself, invariably apply the pad immediately above the symphysis pubis instead of above the fundus uteri. As the only aim of the pad is simply to aid in equalizing the disturbed intra-abdominal tension consequent to the birth of the child, with its resulting diminution in uterine size and overfilling of the abdominal vessels, this position is decidedly faulty, as it not only fails to perform its duty, but also, as has been said, may actually exert a harmful influence upon the uterine body.

FIBROMA OF THE NOSE, WITH REPORT OF A CASE.

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Pure fibromata arising in the nasal chambers and unaccompanied by similar growths in the nasopharynx are comparatively rare, but their occurrence is noted in most treatises on nasal diseases, and cases are cited. The following is the only case of this kind that has come under my notice:

E. J., aged eighteen years, came to the Western Reserve Dispensary, January 20, 1896, with a history of frequent and copious epistaxis and complete stoppage of the left nostril, with a constant purulent discharge from that locality. These symptoms had lasted about thirteen months, with increasing severity, and during that time his general health and strength had become gradually so lowered that at the date of coming to the clinic he was entirely incapacitated for any work. He is the eldest of eight healthy children, and had had no illness previous to this. Parents are both alive and well. No history of any former trouble with the nose or throat.

Patient appeared emaciated and weak, and had slight fever, which he stated was nearly always present. The left side of the face appeared bulging, nose broadened at bridge, causing frog-face. Slight ptosis and exophthalmia, and œdema of lids of left eye, and conjunctivitis on that side. He also complained of sharp, shooting pains over entire left side of head and face. There was present a suppurative otitis media of left ear. On dilating left nostril a grayish tumor, considerably pitted on the presenting surface, appeared protruding into the vestibule and entirely blocking the nostril. The mass was embedded in a thick, glairy, mucopurulent secretion, which showed distinct rise and fall of arterial pulsation. The right nostril contained no growth, but showed the septum bulging considerably to the right side throughout its entire length. A probe on this side passed freely into the nasopharynx. The mass in the left nostril, after cleaning and applying cocaine, was found to be slightly movable by the probe, to which it transmitted a very tough and resilient feeling. The probe, however, could not be passed in any direction around the tumor except in front of it toward the frontal region. Manipulation with the probe caused very free bleeding and some pain, and was followed by a copious discharge of pus. Post-rhinoscopic examination revealed a mass similar in appearance to that seen in front protruding from the inferior and middle meatus. To the finger this mass was hard and very slightly movable. The soft palate was somewhat depressed on the left side, causing thickened speech and difficulty in deglutition. No lymphatic swelling was discovered.

An attempt was made to pass the loop of a cold snare around the tumor, but the wire could not be made to pass alongside of the tumor because of the tough adhesions binding it to the walls of the nostril. By applying the snare twice, however, pieces large enough for microscopic examination were removed, and, although considerable time was taken to remove these pieces, very free bleeding followed. The nostril was then packed with sterile gauze and the patient instructed to report again.

Sections were prepared by staining with hæmatoxylin and eosin, and showed the tumor to be pure fibroma without sarcomatous change.

At the next visit of our patient he was found in a much worse condition. He reported having had frequent large hemorrhages and an increase in the purulent secretion, with intense pains radiating over entire left side of head. Had had chills and fever, and showed signs of pus absorption. He was advised to go into the hospital and to have the tumor removed as soon and as thoroughly as possible.

Operation performed February 22d. An incision was made, beginning a little inside the inner canthus of left eye and carried across the bridge of nose to same point of sound side, and another begun at this point extended to right ala nasi. These incisions extended to bone. Periosteum was pushed aside and, with Hey's saw, the bones were cut through in the line of skin incision. An incision freeing the nose from the upper lip, but avoiding the gingivolabial fold of mucous membrane, was then made, and the septum divided in a line parallel to its anterior border and connecting with the incision at the bridge of the nose. The nasal bone on left side was then seized with strong forceps and the nose turned over on the left cheek. The slight hemorrhage occasioned by this operation was easily controlled by hæmostatic forceps. By the aid of a powerful electric headlight an excellent view of the tumor was then obtained.

During the preparatory operation described above the posterior nares had been plugged with gauze to prevent the blood from running into the throat. The nostril was now cleansed and the gauze packing in the nasopharynx removed. The tumor was examined clear to its attachment in the superior meatus. By means of a thin-bladed spatula the adhesions fixing the tumor to the nasal walls were broken through, and the loop of cold wire snare was passed along the floor of the nose and, by a finger in the nasopharynx, made to surround the tumor protruding through the choana and pushed up as far toward its pedicle as possible. The nasopharynx was then packed with a sponge, and, the anterior end of the loop having been pushed up to the base of the pedicle, the wire was drawn in by slowly turning the snare screw. The pedicle proved to be extremely tough, and the screw of the snare could only be turned by grasping it with forceps. Before the pedicle was divided the wire pulled through the eye of the snare, and a larger wire was quickly attached to one end of the useless loop and dragged into the same position as the first loop and threaded with the snare. The removal was then finished without further difficulty. The patient's pulse and condition at this stage necessitated frequent stimulation, and for this purpose four hypodermic injections of strychnine (gr. $\frac{1}{50}$) were given at short intervals. Profuse hemorrhage followed the removal of the tumor. After packing tightly for a short time the base of the pedicle was curetted thoroughly and afterward burned with Paquelin cautery. The nostril was then packed with iodoform gauze and the nose stitched back in place with silk sutures. Time of operation, fifty minutes. Free use of strychnine hypodermically, and whiskey by enema was ordered. The method of resecting the nose was, in this instance, the reverse of that usually employed, making the principal incision in the sound side. This was done on account of the large amount of purulent secretion which had accompanied the case and which it was suspected came from empyema of some or all of the accessory nasal sinuses. The discharge would therefore continue after the removal of the tumor, and it was feared would greatly hinder the proper healing of the line of incision. The measurement of the tumor immediately after removal was 6½ x 2½ x 1½ cm. The pedicle was 4 cm. long and of the same width as the tumor itself. An examination of the eye-ground on left side showed nothing but slight haziness of the fundus.

The patient needed considerable stimulation for two or three days. The first packing was removed after twenty-four hours and a lighter packing substituted. Very profuse purulent discharge was present for the first few days, but little bleeding. Second packing was removed in twenty-four hours and nose was left open. Nostrils were washed frequently with warm boric solution. Primary healing took place in entire line of incision except near canthus of left eye. At this point a little pus was forced through and a small fistula established, which, however, healed in two or three weeks. Patient was discharged from the hospital ten days after operation, and continued to come to dispensary. Recovery and healing were uninterrupted.

Examinations of the site of the tumor have been made since then at intervals of three or four months, but no recurrence has been observed —a period of five and a half years.

The interest in this case lies in the comparative rarity of the tumor in the nose unaccompanied by similar growth in the nasopharynx, and also in the satisfactory result secured by full exposure of the mass and its thorough removal.

THE CLINICAL VALUE OF BLOOD EXAMINATIONS IN APPENDICITIS. A STUDY BASED ON THE EXAMINATION OF ONE HUNDRED AND EIGHTEEN CASES AT THE GERMAN HOSPITAL, PHILADELPHIA.[1]

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The communication which I have the honor of presenting to the Association, by the invitation of your Secretary, is offered with no slight hesitancy, for, at first glance, it must seem somewhat needless to approach a topic already so familiar to all surgeons, thanks largely to the careful studies made by Cabot, Greenough, and others during the past five years. Still, there are reasons which appear to justify a further consideration of this topic. The fact, for example, that certain of the blood changes in appendicitis have been either overlooked or regarded as trivial, in comparison with other more conspicuous features of the

[1] Read by invitation before the American Surgical Association, 1901.

blood picture, and the tendency of some clinicians to attach undue diagnostic and prognostic significance to the blood report, and of others to regard it as untrustworthy—these reasons, perhaps, are of sufficient weight to render the theme less hackneyed than its title leads one to infer.

METHODS AND TECHNIQUE. The conclusions embraced in this report are based upon data derived from the examination of 118 cases of appendicitis in Dr. John B. Deaver's wards at the German Hospital. All these cases were treated surgically, and the statistics relating to the blood changes represent the condition of the blood before operation, usually at the time immediately after the patient's admission to the hospital. The majority of patients were examined but once, and in the few instances in which multiple estimates were made the data of the initial examinations only were included in the analysis.

Most of the examinations were made by various members of the hospital's house-staff, a few by myself. The services of Dr. G. P. Müller, senior resident pathologist at the hospital, in tabulating and classifying the clinical histories of the patients, have been invaluable.

The hæmoglobin estimates were made with a von Fleischl hæmometer, which, for the sake of greater accuracy, was enclosed in a light-proof box provided with a camera-tube limiting the observer's field of vision to the mixing chamber of the instrument. As a rule, a number of different readings were made by several examiners, and the average of the figures most closely corresponding taken as the final estimate.

Both the erythrocytes and the leucocytes were counted with the same instrument, a Thoma-Zeiss erythrocyte pipette, Toisson's solution being used for diluting the blood, generally in the proportion of 1 : 200. Zappert's counting-slide, having a ruled surface equalling that of 3600 of the small squares of the original Thoma-Zeiss cell, was employed in nearly every instance. The erythrocytes in at least 200 and the leucocytes in not less than 3600 of these small squares were counted, to serve as a basis for the calculation of the total number of cells to the cubic millimetre of undiluted blood.

Differential counts were made only in exceptional instances, in those, for example, with a leucocytosis, in which the symptoms did not suggest appendicitis as a factor of the leucocyte increase, and in those with high-grade anæmia. An absence of any important qualitative changes affecting the blood cells in this disease was thought to justify the omission of differential counting as a routine step in all cases in which the symptoms were definite. In those instances in which the percentages of the different forms of leucocytes were calculated, the figures represent the averages of counts of at least 250 cells, made from heat-fixed films, stained with Ehrlich's triple stain, containing acid fuchsin, methyl-green, and orange-G.

CLASSIFICATION. From a hæmatological view-point all forms of appendicitis may be conveniently classified in two general groups: purulent and non-purulent. The first group includes simple catarrhal and interstitial inflammations of the organ, unattended by abscess formation, by gangrene, and by general peritonitis, singly or combined. The second group comprises cases with pus foci resident in or primarily arising from the appendix, with or without a complicating appendicular gangrene and general peritoneal inflammation. It must be admitted that such a vague classification as this is useful only in so far as it relates to the blood changes to be detected by routine clinical examinations—changes by the aid of which the surgeon endeavors to determine the presence or absence of suppuration and peritonitis, and to trace the progress of the lesion from day to day.

Of the 118 cases included in this report, 38 (or 32.2 per cent.) were unattended by pus formation, while in the remaining 80 (or 67.7 per cent.) this condition prevailed, sometimes with and sometimes without further inflammatory changes. These figures, of course, do not represent the usual ratio between the two forms of the disease just specified, since the cases here collected were not examined in an unbroken, consecutive series.

The features of the blood changes of greatest clinical interest in this disease are the anæmia by which it may be accompanied, and the behavior of the leucocytes, the former being sometimes so decided as to constitute a symptom demanding recognition and serious consideration, and the latter being of prime interest in relation to the diagnosis and the prognosis of the attack.

THE ANÆMIA OF APPENDICITIS. Apparently most writers regard this subject as one of comparatively trivial importance, for beyond the general observation that in chronic cases, presumably septic, a variable decrease in the hæmoglobin percentage and in the number of erythrocytes may occur, the question thus far has been dismissed with but casual notice. The fact, however, should not be ignored that the associated anæmia may be so marked as to constitute a symptom demanding careful attention, even should it not be of sufficient gravity to retard convalescence or to endanger the patient's life.

(*a*) *Hæmoglobin.* Practically every case of appendicitis, whatever its character, shows a variable degree of hæmoglobin loss, this decrease occurring with about equal frequency in both the catarrhal and the suppurative forms of the disease, although in the latter it tends to become more striking in the individual case. Speaking in averages, it will be found that the hæmoglobin is diminished to at least one-half of the normal standard in approximately one case in every ten (10.1 per cent.), while in an occasional instance it falls to a figure which the operators are accustomed to regard as perilously low—

40 per cent. or less—in about three cases (2.5 per cent.) out of every hundred. The fact that such low figures are encountered, although but rarely, seems sufficient to call for a routine hæmoglobin test in all cases to be treated surgically, for should the surgeon meet with such a profound oligochromæmia in a patient whose other symptoms demand the use of the knife, the advisability of an operation might appear to him questionable. Not being a surgeon, I cannot presume to discuss this technical point, but simply draw attention to the fact as suggestive, if not really important. It may be added that, judging from the meagre data at my command, an extreme hæmoglobin loss does not appear, *per se*, to be dangerous, since uninterrupted recovery took place in all the three patients of this series in whom hæmoglobin readings of 40 per cent. or lower were made. Positive conclusions, however, are scarcely justifiable, from so small a number of examinations. Judging from this series the average hæmoglobin loss in all forms of appendicitis is about 30 per cent., the average readings for the 118 cases being 70.1 per cent. of normal, or 69.1 per cent. for the catarrhal, and 70.1 per cent. for the suppurative forms.

(*b*) *Erythrocytes.* The erythrocyte loss, save in exceptional instances, is inconspicuous, since in about three out of every five cases (or in 63.5 per cent.) the number of these cells ranges between 4,000,000 and 5,000,000 to the cubic millimetre, while the latter count is exceeded in about one case in every ten (or in 12.7 per cent.). The average loss for the 38 catarrhal cases was 16.2 per cent. (average count 4,186,846), and for the 80 suppurative cases 11.9 per cent. (average count, 4,400,145), while the most striking examples of oligocythæmia in the individual case were practically equal in both forms—59 per cent. decrease in the non-suppurative and 58 per cent. loss in the suppurative, figures corresponding to counts of 2,050,000 and 2,100,000 per cubic millimetre respectively.

These results tend to show that, contrary to the current view, patients suffering from catarrhal appendicitis may be found to be anæmic just as frequently as those suffering from forms of the disease associated with abscess formation and easily recognized symptoms of septicæmia—a characteristic with which I have been frequently impressed long before this attempt was made to analyze the statistics of the blood counts. Perhaps the fact that the majority of these non-suppurative appendicitides were of chronic character, occurring in patients whose constitutions, undermined for a long period, were greatly debilitated, may serve to explain the frequency of anæmia in this variety of disease. Thus it appears that this factor of inadequate blood production is quite as active in provoking anæmia as is the element of sepsis, which is largely responsible for the blood destruction in suppurative appendicitis.

(*c*) *Color Index.* The color index, or the figure used to indicate the richness in hæmoglobin of the individual erythrocyte, is usually found to be moderately subnormal, ranging from about 0.70 to 0.80 in the great majority of counts. The index for the total 118 cases of this series averaged 0.82 plus, or about 18 points below the arbitrary standard, 1.00; in the 38 non-suppurative cases it was 0.82, and in the 80 with abscess, 0.79. The foregoing data apply, of course, only to averages, but they tend to show that an anæmia of the ordinary secondary type prevails in appendicitis—that is, one in which the hæmoglobin loss is usually somewhat relatively greater than that of the corpuscles. In the individual case, however, the index may fall to quite as low a figure as that commonly found in chlorosis, to 0.53, in one of these cases for example; or, on the other hand, it may rise to as high a figure as that which prevails in typical pernicious anæmia, to 1.50 in another case in the series, for instance.

In cases with severe anæmia deformities of shape and size were commonly noted, but neither nucleated erythrocytes nor decided evidences of atypical staining were observed. The number of stained specimens examined, however, was too small to attach to these remarks any value regarding the occurrence of erythroblasts and of polychromatophilic cells. There is no good reason why both should not be found in cases in which the anæmia is of a sufficiently grave type.

The range of the hæmoglobin and erythrocytes is illustrated by the following table:

TABLE I.—HÆMOGLOBIN AND ERYTHROCYTES.

Hæmoglobin, percentage.	Simple catarrhal and interstitial forms. (38 cases.)			Cases with abscess, gangrene, or general peritonitis. (80 cases.)		
	Acute.	Chronic.	Total.	Acute.	Chronic.	Total.
Above 100 per ct.	1	0	1	0	0	0
90 to 100 "	0	0	0	4	0	4
80 " 90 "	3	6	9	14	3	17
70 " 80 "	4	5	9	26	0	26
60 " 70 "	3	8	11	17	0	17
50 " 60 "	5	1	6	6	0	6
40 " 50 "	2	0	2	6	1	7
30 " 40 "	0	0	0	3	0	3
Highest,	102 per ct.	86 per ct.	102 per ct.	98 per ct.	90 per ct.	98 per ct.
Lowest,	45 "	60 "	45 "	38 "	48 "	38 "
Average,	69 "	72.7 "	69.1 "	71.7 "	76 "	70.1 "
Erythrocytes per c. mm.						
Above 5,000,000	1	3	4	9	2	11
4,000,000–5,000,000	10	13	23	50	2	52
3,000,000–4,000,000	6	4	10	12	0	12
2,000,000–3,000,000	1	0	1	5	0	5
Highest,	5,660,000	5,620,000	5,660,000	5,710,000	5,240,000	5,710,000
Lowest,	2,050,000	3,100,000	2,050,000	2,100,000	4,490,000	2,100,000
Average.	4,240,389	4,348,000	4,186,846	4,372,500	4,925,000	4,400,125

THE RANGE OF THE LEUCOCYTES. The numerical fluctuations of the leucocytes constitute, by all odds, the most important feature of the blood picture associated with this disease, and the behavior of these cells has been regarded as a sign both of diagnostic and prognostic value, to interpret with more or less accuracy the pathological condition of the local lesion, and to furnish information as to the presence or absence of complications. To what extent the leucocyte count can be relied upon as a dependable clinical sign, and to what extent it may prove misleading, in routine clinical work, I have attempted to determine by the following inquiry:

In the catarrhal and interstitial forms of appendicitis, without abscess or any of its consequences, the number of leucocytes, as a rule, does not exceed the maximum normal standard (10,000 per cubic millimetre), and, indeed, is not infrequently much below this figure. In a fairly large proportion of cases, however, exceptions to this rule must be noted, for counts of 12,000, 15,000, or, rarely, even higher may sometimes be encountered. In the present series, 39.4 per cent. of the cases (15 cases) showed a leucocyte increase ranging between 10,000 and 17,000, the latter being the maximum, while in 60.5 per cent. (23 cases) the counts were below 10,000, the minimum estimate being 1600. It may be observed in passing that the maximum count of the individual case of catarrhal appendicitis is somewhat lower than the average count in the purulent variety, to be considered later.

It does not seem unreasonable to attribute the majority of these high counts to the presence of a local non-purulent inflammation restricted to the peritoneal covering of the appendix, since a circumscribed peritonitis of this sort is not uncommon in this form of the disease, and is quite sufficient to account for the leucocytosis. In other cases the possibility that the increase represents simply a blood-finding of the associated anæmia must naturally be suggested; or, again, that it may be the result of blood inspissation, for the production of which copious emesis or purging may have been the factors.

In cases with abscess, gangrene, or general peritonitis a well-marked leucocytosis is found in most instances, the majority of appendicular abscesses raising the count to 15,000 or 20,000 per cubic millimetre, and sometimes to even a higher figure. It is, however, a well-recognized fact that, should the pus focus happen to be so effectually walled off that little or no absorption of the toxic material can occur, such a decided increase may fail to develop. On the other hand, leucocytosis may also be absent, or, indeed, leucopenia may be found, in profoundedly septic patients, in whom the effects of the poison have proved so crippling that reaction is stifled. However active may have been this factor in the experience of others, in my own experience it has been rarely found that a patient's resisting powers were so effectually overcome that leucocytosis was prevented, for in only two out of my twelve fatal cases (or in 16.6 per cent.) was a well-defined leucocytosis absent, the counts in these two cases being 6000 and 11,200 respectively. In the other ten counts the number of leucocytes ranged from a minimum of 14,200 to a maximum of 58,500, and averaged 19,400 per cubic millimetre.

TABLE II.—FATAL CASES.

No.	Hæmoglobin.	Erythrocytes	Leucocytes.	Remarks.
1	71	4,580,000	11,200	
2	98	5,420,000	14,600	36 hours after operation.
	98	5,460,000	10,200	6 days " "
	96	5,430,000	16,800	9 days " "
3	88	5,280,000	58,500	
4	100	5,120,000	15,200	General peritonitis.
5	85	4,870,000	22,800	
6	75	4,550,000	16,000	
7	68	4,470,000	19,600	
8	79	3,840,000	21,500	
9	94	5,000,000	6,000	
10	95	4,110,000	14,200	Immediately after operation.
	90	4,150,000	20,400	1 day after operation.
11	75	4,970,000	14,800	
12	46	2,760,000	11,600	

From these figures it is natural to infer that the degree of leucocytosis, as determined by a single examination, cannot be relied upon as a prognostic sign. If, however, by repeated examinations a progressive increase in the number of leucocytes is detected, it may generally be concluded that the pus collection has become more extensive or that a general peritonitis has been excited. Such accidents as these were heralded in three cases of this series, by an increase varying from 6600 to 14,000 cells to the cubic millimetre in excess of the number previously counted. Perforation is usually accompanied by an abrupt rise in the leucocytes, although it is to be recalled that in greatly debilitated individuals this increase may be absent, or, indeed, a sudden decrease may occur. Personally, I have not investigated this question with sufficient thoroughness as to warrant definite conclusions as to the behavior of the leucocytes under these circumstances.

Absence of leucocytosis has also been observed in cases in which the pus focus is of small extent, but small abscesses are by no means always associated with low counts, for the intensity of the systemic reaction provoked by the abscess, and not the extent of the latter, appears to be the more active determining factor of the increase.

In the present series the count for purulent cases averaged 17,453, or somewhat less than double the average figure for the catarrhal variety. The leucocytes were in excess of 15,000 per cubic millimetre in 62.5 per cent., or 50 of the counts, and in excess of 20,000 in 25 per cent., or 20 counts, reaching a maximum of 58,500 in a single instance. In

37.5 per cent., or 30 counts, the number of cells was below 15,000, the lowest estimate being 6000.

In the few cases with leucocytosis in which differential counts were made it was found that the increase was due chiefly to a decided absolute and relative increase in the polynuclear neutrophiles, the lymphocytes, the large mononuclear forms, and the eosinophiles being relatively diminished. Neither myelocytes nor basophilic leucocytes were observed in any of the examinations.

The following table represents the range of the leucocytes in the 118 cases examined:

TABLE III.—LEUCOCYTES.

Leucocytes per c.mm.	Simple catarrhal and interstitial forms. (38 cases.)			Cases with abscess, gangrene, or general peritonitis. (80 cases.)		
	Acute.	Chronic.	Total.	Acute.	Chronic.	Total.
Above 50,000	0	0	0	1	0	1
40,000 to 50,000	0	0	0	0	0	0
35,000 " 40,000	0	0	0	2	0	2
30,000 " 35,000	0	0	0	0	0	0
25,000 " 30,000	0	0	0	3	0	3
20,000 " 25,000	0	0	0	14	0	14
15,000 " 20,000	4	0	4	30	0	30
10,000 " 15,000	2	9	11	19	3	22
5,000 " 10,000	8	9	17	7	1	8
Below 5,000	4	2	6	0	0	0
Highest,	17,000	15,000	17,100	58,500	14,600	58,500
Lowest,	1,600	2,400	1,600	6,000	8,800	6,000
Average,	9,124	9,190	9,158	17,718	12,425	17,453

To recapitulate, an analysis of the foregoing data appears to warrant the following conclusions:

1. The average case of appendicitis before operation shows a loss of about 30 per cent. of hæmoglobin and of more than half a million erythrocytes per cubic millimetre. Occasionally the anæmia is of a grade so high that it appears to constitute in itself a serious complication and to raise a doubt as to the safety of surgical interference, should the latter otherwise be indicated. Doubts on this score, however, have not been justified by the records of the cases included in this series.

2. Moderate leucocytosis may occur both in the absence and in the presence of an abscess and its consequences. It accompanies about 35 per cent. of non-purulent and 90 per cent. of purulent cases.

3. Leucocyte counts ranging between 10,000 and 15,000 or 17,000 cannot be depended upon to reflect the nature of the local lesion, since this degree of increase may be found both in mild catarrhal and in purulent cases. Counts of 20,000 or more almost invariably indicate the presence of pus, gangrene, or general peritonitis, one or all.

4. Leucocytosis may be absent both in trivial catarrhal and in fulminant cases, as well as in forms of circumscribed abscess.

5. In operative cases thorough evacuation of the abscess is followed within a few days by a decline to normal in the number of leucocytes, provided that the recovery of the patient is uneventful. Persistence of a leucocytosis after the third or fourth day following the operation may usually be attributed either to undrained pus pockets, to general peritonitis, or to both of these factors.

VALUE OF THE BLOOD CHANGES AS DIAGNOSTIC AND PROGNOSTIC SIGNS. It is obvious that the range of the leucocytes, if correlated with other clinical symptoms, may serve as a diagnostic sign of definite value. On the other hand, the fact cannot be emphasized too forcibly that an absence of leucocytosis, except in conspicuously septic patients, signifies nothing definite.

Regarding a leucocytosis of 20,000 or higher as a practically certain indication of pus or its consequences, in my experience in one out of every four cases of appendicular abscess the diagnosis is justified by the behavior of the leucocytes. This may seem a most conservative estimate of the value of the leucocyte count in recognizing such a condition, and its acceptance certainly restricts the utility of the blood count as a diagnostic aid, but repeated observations have proved the fact that a leucocytosis of less than 20,000, or at the minimum, 17,000, cannot be relied upon as a trustworthy sign of pus, although, as already pointed out, pus may exist with much lower leucocytoses.

In a patient unmistakably septic absence of leucocytosis should be interpreted as a sign of an intense infection, the prognosis of which is more likely grave than favorable. A high leucocytosis in such instances does not necessarily indicate a favorable prognosis, but simply represents an intense infection coupled with normally active resisting powers on the part of the patient.

Absence of leucocytosis in a patient with mild, indefinite symptoms is a clinical sign of no tangible value in so far as it may serve in detecting the presence of pus, since a large abscess, if thoroughly circumscribed, may exist without causing the slightest increase in the number of leucocytes.

In cases treated surgically the adoption of daily leucocyte counting as a routine procedure during the first week after the operation furnishes the surgeon with definite information regarding the progress of the case, since the advent of complications or the failure to secure complete evacuation of pus foci may be detected by the persistence of or an increase in the leucocytosis.

Unfortunately, it happens that just those conditions which bear the closest resemblance to appendicitis, as a rule, give rise to blood changes identical with those found in the latter disease, so that the value of the blood count as a means of differential diagnosis is greatly limited. Thus, leucocytosis is the rule in such conditions as ovarian abscess, pyosalpinx, ectopic pregnancy, perinephritic abscess, hepatic abscess, empyema of the gall-bladder, and malignant disease of the cæcum, all of which have been confused with appendicitis. Such a large proportion of renal and hepatic colics are associated with inflammatory complications which provoke leucocytosis that neither of these conditions can be distinguished with any degree of confidence from appendicitis simply by the examination of the blood. Acute gastritis is sometimes accompanied by a well-marked leucocytosis, and sometimes by none at all, so that the blood count cannot be relied upon as a clue in distinguishing this disease from appendicitis. The same is true of dysmenorrhœa, in which disease uterine inflammatory changes may be the factor of a leucocyte increase. Should the diagnosis lie between appendicitis and enteric fever, the former is suggested by the presence of a leucocytosis, since this sign practically never occurs in typhoid, except in the event of some obvious complication, such as hemorrhage from the bowel or perforation.

In doubtful cases a leucocytosis is sufficient to exclude such non-inflammatory lesions as simple enteralgia, lead colic, ovarian neuralgia, an ovarian cyst, and a movable kidney.

In conclusion, allow me to urge the more frequent employment of hæmatological examinations, not only for the light which they throw upon the coexisting anæmia present in some instances, but as a means of detecting with certainty a purulent from a non-purulent appendicular lesion in a fairly large percentage of cases. The limited number of non-inflammatory conditions from which this disease may be distinguished by the behavior of the leucocytes should also be remembered. The surgeon who attempts to use the blood count in appendicitis as a definite, pathognomonic sign soon will run afoul of diagnostic disasters, but he who regards it as only a symptom, invariably to be correlated with other equally if not more important clinical manifestations, cannot fail to find this method of inquiry of signal value in routine clinical surgery.

THE BLOOD COUNT AT HIGH ALTITUDES.[1]

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ASSISTED BY
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The study of the blood and its changes is extremely interesting. You will pardon the writer for again calling your attention to its consideration. We were made familiar with the number, size, color, shape, and physiological functions of the red blood-corpuscles twenty-five or more years ago in the beginning of our medical reading. Renewed interest has been taken in the study of the blood in recent years. Now, the hæmatologist would have us look to him for the diagnosis of many diseases, and, as general practitioners, we are glad to seek his aid where formerly we were content to rely upon physical examinations.

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[1] Read before the American Climatological Association, 1901.

We wish here to present but one phase of the subject of the blood, viz., that of the red corpuscle count in high altitudes. A number of years ago Paul Bert called the attention of the profession to the discovery he made, that the number of red corpuscles was increased in high altitudes. Since he announced his discovery many physiologists and scientists have confirmed it. The object of our paper is not to add another confirmation to those of other observers, but to give a few investigations that we have made as to the permanency and transitory phases of this increase. For convenience of consideration we will divide the subjects into two divisions, viz., those who have lived for some time at a high altitude and those who go for only a few hours.

The question of an increased blood count in residents of high altitudes may be considered as conceded. Prominent among those who have made this subject a study we find the names of Viault, Egger, Wolf, Herrera and Lope, Solly, and others. The following table, compiled by Herrera and Lope from data of many observers, will show the gradual increase in the blood count as we ascend in altitude:

At Christiania,	sea level		(Iaoche)	4,970,000
" Paris,	78	metres	(Hayem)	5,000,000
" Göttingen,	148	"	(Schaper)	5,225,000
" Tübingen,	314	"	(Reinert)	5,322,000
" Zurich,	412	"	(Stierlin)	5,752,000
" Auerback,	400–450	"	(Wolf and Koppe)	5,748,000
" Reiboldogrun,	700	"	(" " ")	5,970,000
" Arosa,	1800	"	(Egger)	7,000,000
" City of Mexico,	2280	"	(Herrera and Lope)	6,500,000
" Morococha,	4392	"	(Viault)	8,000,000

We note that they found the average at the City of Mexico, 6410 feet, to be 6,500,000. Solly, in counting the blood of twenty-five students of variable length of residence in Colorado Springs, altitude 6000 feet, found the count to be 5,927,000. In four natives, and three who came to Colorado under seven years of age, the average number was 5,724,550. Our own observation on twenty subjects gives us an average of 5,700,300. Thus we note there is a decided increase in the count at 6000 feet over that at sea level. At Morococha, 14,274 feet, Viault found the count to be 8,000,000. There are no records of blood counts of people who have been sometime on the summit of Pike's Peak except that made by Dr. Holmes, of Denver. He examined the blood of a man who had remained on the Peak almost continuously for six months, and found the count to be 6,788,000. We note the marked difference between the blood counts taken at Colorado Springs and those taken at the City of Mexico at practically the same altitude. This may be due in part to the instruments used, but we believe it to be due in a greater degree to the warmer climate of the City of Mexico. Heat is one of the important factors in producing a permanent rise in the blood count.

To demonstrate the permanent increase we took three Belgian hares to 10,000 feet altitude and two to the top of the Peak. The following table will show the result of the experiment:

No.	6,000 feet.	On arrival, 10,000 feet.	After three weeks, 10,000 feet.	Mesentery.
1	6,070,000	6,880,000	7,462,000	7,715,000
2	6,480,000	6,500,000	7,382,000	7,920,000
3	6,470,000	6,020,000	6,500,000	6,667,000
Average . .	6,340,000	6,467,000	7,148,000	7,434,000

In Nos. 1 and 2 we note quite an increase in the number of corpuscles from a three weeks' sojourn at an increased altitude of 4000 feet. No. 3 did not show the increase, but remained at about the same number. The rabbits taken to the Peak did not do well. The keeper of the Summit House tells us that they became very sick after ten or twelve hours, crying pitifully and panting for breath. Before morning one of them died, demonstrating that Belgian hares can sicken and die at high altitudes. The following is the report on the remaining rabbit after three weeks' stay on the Peak: Count, 6000 feet, 6,280,000; on arrival at summit, 7,200,000; after three weeks on the summit, 7,280,000.

We note the rapid rise on going to the Peak. This rise was only slightly increased by three weeks' stay on the Peak. We observed quite a number of microcytes in the count after the three weeks at a higher altitude. The size of the corpuscles varied. No measurement of the corpuscles was made, but the variation was quite noticeable to the eye.

To what shall we attribute this permanent increase in the count? There is one chief cause, viz., diminished barometric pressure. There are many auxiliary causes. Among these we might mention the greater number of clear days, hence the increased amount of sunlight; the purer atmosphere, hence less obstruction to the sun's rays; the lessened humidity, both absolute and relative; the out-door life of the people permitted by the foregoing conditions. Apropos to this subject we note the conclusions of Herrera and Lope on the modification of the human body from a residence in elevated regions:

"Increase in the number of respirations.

"Increase in the number of pulsations.

" Increase in capacity of respiratory organs.

" Increase in mobility of the walls of the thorax.

" Increase in number of red blood-corpuscles and all principles fixed in the blood in general.

" Increase in density of the blood.

" Increase in density of the urine and all economic liquids in general (secretion of milk, etc.).

" Diminution of the intravascular tension of the blood."

We note these changes throughout the system, and our observations during a residence of eleven years confirm their accuracy. As a result of the diminished barometric pressure we have a diminution in the amount of oxygen or a " reduction of oxygen pressure." The animal economy requires a definite amount of oxygen to maintain its equilibrium, hence changes must take place in the body to meet these requirements. The red blood-corpuscles are the hæmoglobin carriers, hence they would be the first to multiply to meet the necessities of the body. Therefore, the blood-corpuscles remain permanently higher to compensate for the less amount of oxygen in the atmosphere.

The length of time required to establish an equilibrium in the circulation is short. As noted in our experiments on rabbits taken to the Peak, referred to later in our paper, we see the increased count is at first at the expense of the abdominal circulation. In our rabbits after three weeks the count is increased in general, and is as high in the mesentery as in the peripheral capillaries.

We will now call your attention to the rapid increase of blood-corpuscles as we ascend to a high altitude. The facilities for making these observations are as good if not better in Colorado than anywhere in the civilized world. Our city of Colorado Springs, located at the base of Pike's Peak, has an altitude of 6000 feet. We are connected by rail with the summit of the Peak, having an altitude of 14,147 feet. Without any exertion we can be elevated to the summit of the Peak in one and one-half hours. This gives us an opportunity to observe the blood changes and effects of altitude without having to eliminate the element of exercise. The cog road running to the summit of the Peak is well built, and there is comparatively no excitement to cause changes in the circulation. We are indebted to Mr. C. W. Sells, manager of the road, for courtesies shown us and much valuable information given. He informs us there has never been a death on the Peak since the road was open ; and comparatively few persons complain of the effects of altitude.

As preliminary work we took to the Peak during October, 1900, seven young and vigorous men to see whether we would find the blood count increased by an increase in altitude without exertion. We found a material one in five out of the seven, and thought we made mistakes in the technique of the other two subjects. These observations inspired us to go further into the investigation of the subject, and try to account for this sudden increase. The great amount of labor involved in these observations is only appreciated by those who try to carry them on and at the same time attend to the regular routine of a general practitioner. Owing to this latter fact, I have limited this paper to the consideration of the blood count alone, and have drawn on outside sources for my authority as to blood pressure and other facts. Our observations were not limited to the blood count alone, but we have not had the time to investigate other features of the subject, and we do not give our paper as a complete thesis on blood changes at high altitudes.

I have interested in this work Dr. H. W. Hoagland, to whom I am indebted for a great portion of the practical work and many valuable suggestions.

A few words concerning the technique of our blood counting will suffice. Our examinations were all made with the Thoma-Zeiss apparatus. We were very exact in all details. Two counts were made from two separate drops of each specimen and the average taken. The blood was mainly obtained from the tip of the finger. In the experiments done during massage the blood was taken from the skin of the forearm. The blood was not encouraged to flow by squeezing or stretching the skin, as we found early in our work that these methods changed the count and would furnish unreliable data. The counting was done in Colorado Springs, the pipette being filled at the desired altitude and carefully carried to our office. Being aware of the criticism of the Thoma-Zeiss apparatus (Gottstein) at high altitudes or under diminished barometric pressure, we thought best to make all counts at one altitude. Gowers' solution (sod. sul., acet. acid, and aq.) was used as the diluting medium. We found the rabbit to be rather an unreliable animal for experimental purposes in blood counting. It is difficult to draw blood on the surface of the body unless an extensive laceration is made, except in the ears. They are timid and impressionable, and the circulation in the capillaries of the ears varies greatly under different degrees of excitement, hence they have to be carefully handled.

In our preliminary work we found that the blood count was 250,000 to 500,000 more per cubic millimetre in Colorado Springs than at the sea level. We found an increase of from 300,000 to 500,000 corpuscles per cubic millimetre by ascending Pike's Peak on the cog road without exertion. Was this a fictitious increase, or was there a true multiplication of red corpuscles? This is a mooted question, and it was for the purpose of trying to solve it that the following experiments were made during the past few months. We do not claim originality in all the experiments, but we will say that they were all original with us, as far as the conception in our minds was concerned. We knew not that others had investigated along the same line until the most of our experiments had been made (*Journal of the American Medical Association*, April 20, 1901).

Being convinced that the rapid multiplication of blood-corpuscles in our preliminary examinations was not a permanent one, we made the following experiments to see if the count could not be varied by many influences not accredited to altitude. The following table will show the effect of running one-half mile:

No.	Name	Age	Weight	Pulse.		Time after meal.	Distance run.	Time in run.	Temp. of room.	Blood count.	
				Rest.	Exercise.					Rest.	Exercise.
1	C.	44	190	82	132	3 hrs.	½ mile	8 min.	65°	5,510,000	5,610,000
2	H.	27	150	82	148	3 "	"	7 "	65	6,460,000	6,360,000
3	W.	24	147	88	134	1 "	"	5 "	67	5,380,000	5,820,000
4	H.	81	145	78	114	2 "	"	8 "	67	5,950,000	6,400,000
5	M.	22	164	66	132	2 "	"	5 "	62	5,830,000	6,570,000
6	C.	18	134	82	150	2 "	"	5 "	62	5,780,000	5,690,000
7	C.	18	135	84	148	2 "	"	5 "	62	5,260,000	5,690,000
8	B.	18	136	60	132	2 "	"	4 "	68	6,570,000	6,660,000
9	B.	14	87	78	142	2 "	"	5 "	68	5,410,000	6,270,000
10	W.	15	154	90	148	2 "	"	6 "	68	5,830,000	6,000,000
Average		23	144	79	138	......	......	5 "	......	5,748,000	6,132,000

The exercise, with one exception, No. 2, increased the blood count. The average count was increased about the same as by an ascent to the Peak without exertion. The heart's action was increased and the peripheral capillaries dilated, as shown by the ruddy color of the skin and the moisture from perspiration. We cannot here account for the increase of count by the multiplication of corpuscles, although some investigators might do so by the abstraction of water by sweating.

Finding that general exercise of the body increased the count, it occurred to us to investigate whether the count could be increased in one member of the body over that found in a corresponding member of the same body. We made seven tests of this character. One arm was kept at perfect rest, while the other arm was massaged and rubbed vigorously for ten minutes. At the same time the subject opened and closed the hand continuously. By these methods we sought to increase the circulation to as great a degree as possible. The counts were made simultaneously in both arms. The following table will show the results of our experiments:

No.	Age.	Weight.	Pulse.	Time after meals.	Arm at rest.	Arm exercised.
1 . . .	18	136	60	2 hours.	5,980,000	6,320,000
2 . . .	15	154	82	2 "	5,830,000	5,940,000
3 . . .	18	160	78	2 "	6,000,000	6,490,000
4 . . .	18	136	60	2 "	5,810,000	6,010,000
5 . . .	17	145	84	2 "	5,770,000	6,000,000
6 . . .	44	190	75	2 "	6,260,000	6,510,000
7 . . .	44	188	78	2 "	5,480,000	5,550,000
Average	25	158	74	....	5,875,714	6,117,143

We note quite a material increase—241,429—in the blood count. This can only be accounted for by the increased flow of blood in the arm, due to massage, although a possible difference might be produced by an accumulation of carbonic acid in the blood, the result of the violent exercise of the muscles. Cabot tells us that poisoning from carbonic acid gas will increase the blood count. Nevertheless, we believe the increased count was due to vasomotor conditions. There is considerable fatigue to the subject during this experiment. The circulation is slightly quickened, and we noted a higher count in the quiet arm than in the same subjects on other occasions when the blood was counted when the whole body was at rest. Dr. J. K. Mitchell, of Philadelphia, in an interesting paper on "Massage and the Blood" (THE AMERICAN JOURNAL OF THE MEDICAL SCIENCES, vol. cvii.), has shown that the count is invariably increased in massage unless the subject had been physically fatigued immediately before receiving the treatment. Here, again, we have a changed condition of the cutaneous bloodvessels due to manipulation, provided they had not been previously dilated by exercise.

Having satisfied ourselves in our own experiments and by the experiments of others that the blood count could be increased by causing a dilatation of the peripheral capillaries by exercise or manipulation, it occurred to us that we might be able to diminish the count by causing a contraction of the capillaries. We made three counts, with the results as shown in the table following, after packing the arm to the elbow in snow.

No.	Age.	Weight.	Time after meals.	Normal.	Arm in snow 10 minutes.	20 minutes later.
1	44	190	2 hours.	5,510,000	5.140,000	5,430,000
2	18	135	2 "	6,570,000	4,545,000	5,060,000
3	15	154	2 "	5,830,000	4,915,000	5,280,000
Average	25	159	......	5,970,000	4,870,000	5,257,000

We made three counts of each individual; one in hand not experimented with; one simultaneously in the hand in the snow, and one after reaction had partially taken place. As noted in the table, we were able to materially decrease the count, and it gradually came back toward its normal count as reaction took place.

It also occurred to us to try what effect intense heat would have on the count, knowing that it would produce contraction of the bloodvessels similar to the intense cold. We accepted the proffered courtesies of Dr. B. B. Grover, of this city, and tested five subjects in the Betz hot-air apparatus. The table will show the degree of heat applied and the results on the count.

No.	Age.	Weight.	Pulse.		Degree of heat.	Length of time.	Blood count.	
			Before.	After.			Baked arm.	Outside arm.
1 . .	44	190	78	88	325°	15 min.	4,690,000	5,710,000
2 . .	18	186	60	88	350	10 "	5,460,000	6,050,000
3 . .	15	154	90	100	350	10 "	5,570,000	6,070,000
4 . .	16	152	88	100	350	10 "	5,500,000	5,800,000
5 . .	15	148	96	88	350	10 "	5,800,000	6,480,000
Average	22	156	82	93	......	......	5,404,000	6,022,000

The count will be seen to have been materially lessened in the arm subjected to the intense heat. As noted in the experiments where one arm was massaged the general count was increased owing to the subject becoming quite warm. The arm baked perspired quite profusely, and the skin was shrivelled by the sweat when removed from the apparatus. The blood count, being lowered under such an amount of abstraction of watery elements, would indicate that the increase of blood counts cannot be due to the abstraction of water from the surface of the body.

The late spring snows delayed us from making as many experiments as we would like to have done on the top of Pike's Peak before submitting the report of our observations to the Association. But we feel that they have been sufficiently numerous to demonstrate certain features in regard to blood counts. We would call your attention to the following table:

No.	Age.	Wt.	6,000 feet.		10,000 feet.		14,147 feet.		6,000 feet.	
			Pulse	Count.	Pulse	Count.	Pulse	Count.	Pulse	Count.
1	44	189	78	5,760,000	84	6,070,000	84	6,100,000	78	5,790,000
2	27	150	80	6.420,000	104	6,440,000	96	6,510,000	82	5,840,000
3	17	135	80	5,740,000	80	5,700,000	84	5,730,000	78	5,670.000
4	16	150	82	6,150,000	88	6,280,000	80	6,390,000	80	5,970,000
5	19	160	90	6,040,000	84	6,150,000	88	6,240,000	85	6,420,000
6	18	145	60	5.890,000	62	6,750,000	78	6,960,000	60	5,500,000
7	19	120	80	5,680,000	86	6,340,000	92	6,380,000	78	5,575,000
8	40	123	78	6,120,000	80	6,105,000	88	6,485,000	76	5.700,000
9	51	112	84	5,480,000	88	6,670,000	90	6,170,000	80	5,090,000
10	20	140	84	5,170,000	88	5,790,000	96	5.955,000	82	5,790,000
Aver.	27	142	80	5,845,000	84	6,229,500	88	6,292,000	78	5,734,500

The last four subjects were women.

As stated in the beginning of our paper, we want to confine our consideration of the study of the blood to the blood count alone and its probable cause. We made other observations, but will leave them for future consideration. We note from the table that the average blood count at 6000 feet is 5,845,000; that it increases to 6,229,500 at 10,000 feet, and that there is a still further increase on top of the Peak—14,147 feet—to 6,292,000. When we returned to 6000 feet the count again dropped to the normal for this elevation or even below it. We want to say for the subjects of these experiments that they were all healthy and had been in Colorado for variable lengths of time. The first count was made in the morning before breakfasting, as it is claimed that the count is modified during digestion. The second and third counts, taken at 10,000 feet and 14,147 feet respectively, were made while seated in the railroad carriage, thus doing away with any element of exercise. The only other influence that could have made any impression was the mental excitement incident to the ride up the steep ascent. The subjects were accustomed to mountain life and travel, and were as little excited as it is possible for one to be, hence this element was reduced to a minimum. The fourth count was made on the return to Colorado Springs after a light lunch. We have tried to eliminate all sources of change of the blood count except those due to altitude. From these observations we are convinced that the count is increased in the peripheral bloodvessels as we ascend, and again falls to its normal condition when the original altitude from whence we started is reached.

To further demonstrate this we took three rabbits to the Peak. We examined their blood before starting and immediately on arrival on the Peak. We note the increase in the peripheral count. We also made a count from the mesenteric circulation, which shows a marked diminution as compared with the external capillaries as it also does to what it was on starting from Colorado Springs. The blood for the mesenteric count was taken as follows: The rabbit was fastened to a board. With one stroke of the knife the abdomen was laid open. After drying the surface from which the blood was taken to avoid the possible error of diluting the blood with peritoneal secretion, a small vessel was punctured and blood taken therefrom. The length of time consumed in getting the blood into the pipette was ten to fifteen seconds. The following table will show the results of the experiments:

No.	6,000 feet. Count from ear.	14,147 feet. Count from ear.	14,147 feet. Count from mesentery.
1	6,210,000	6,636,000	5,760,000
2	6,530,000	7,040,000	6,230,000
3	5,520,000	6,230,000	5,700,000
Average	6,087,000	6,635,000	5,897,000

This shows a marked increase in the blood count on rapid ascent—584,000. It also shows that this rapid increase is at the expense of the internal circulation, as the external capillary count shows a plurality over the internal of 738,000. We further note the marked decrease of the internal count—190,000—compared with the count at Colorado Springs before starting.

We are convinced that this rapid increase in the blood count is not a true multiplication of blood corpuscles, but a fictitious one due to the calling of the blood to the surface of the body incident to diminished barometric pressure and increased heart's action.

Herrera and Lope have shown by extensive experiments that the arterial tension is diminished as the barometric pressure is lessened. They have given us the following law: "When certain conditions are equal the vascular tension is in direct ratio with the barometric pressure." It is not necessary here to outline their experiments, but they have been extensive and their deductions seem conclusive.

A. Mosso, who has experimented extensively in the Alps (*Life of Man on the High Alps*, p. 187), recognizes the dilated condition of the external bloodvessels and the results thereof. He says: "The rapid changes of the pulse observed during ascents, and more especially during mountain sickness, are due to the state of the bloodvessels. When these dilate the resistance opposed to the circulation of the blood is diminished and the heart beats more rapidly."

Our experiments lead us to the following conclusions as to the rapid increase in blood count as we ascend:

1. The blood count increases as we ascend (without exertion) at the rate of 50,000 corpuscles per cubic centimetre of blood per thousand feet.

2. The pulse-rate increases in the same ratio as the blood count, the count rising as the pulse rises, and in like proportion falling when the pulse-rate falls, showing that the heart seeks to overcome the changes brought about by the lessened barometric pressure.

3. The increase is not a true multiplication of the blood-corpuscles, but is due to a changed vasomotor condition in the peripheral vessels incident to diminished barometric pressure. This condition of vasomotor control of circulation and blood count was demonstrated in the various experiments made, where it is shown that the count can be increased or diminished by any means that will dilate or contract the peripheral capillaries.

4. This is further demonstrated by the experiments on the rabbits, which showed the same increase as man, and by the mesenteric count demonstrated that the external capillary count was increased at the expense of the internal abdominal circulation.

5. The increase in blood count disappears and the heart's action returns to the normal when we return to the altitude from whence we started. This is another confirmation of the fact that the increase is a fictitious one, and is due to a diversion of the blood current incident to diminished barometric pressure.

6. The dilatation of the external capillaries (skin and lungs) would not alone account for all the increase, but with this dilatation we have another effect of diminished barometric pressure, viz., diminished arterial tension. With vessels of an increased calibre and a heart with a dimin-

ished force we can plainly see that we will have more or less of a temporary stasis in the dilated capillaries. In the course of time nature seeks to adjust an equilibrium in the economy of those who live at high altitudes. The heart becomes more forcible by the strengthening of its muscles, and the circulation becomes more equitable. Hence the gradual decline in the blood count (Solly) of those who have remained for some time at a high altitude.

7. The want of increase of hæmoglobin in proportion to the increase of blood count in ascents is accounted for by the fact that the blood corpuscles, the carriers of the hæmoglobin, are not increased at once in high altitudes. After remaining some time at a high altitude the true increase in blood-corpuscles takes place, and with it the increase of hæmoglobin.

CRITICAL SUMMARY OF RECENT SURGICAL PROGRESS IN THE DIAGNOSIS AND TREATMENT OF CONTUSIONS OF THE ABDOMEN.

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Subcutaneous injuries of the abdomen vary from a superficial ecchymosis beneath the skin to the most extensive shattering of the peritoneal contents. A simple contusion is one in which the viscera are uninvolved and which ends in recovery. Cases of simple contusion have perished from "shock or disturbance of the solar plexus." Crile[1] holds that the solar plexus may be disregarded as a factor, the cause of the striking phenomena being the mechanical effect of violence on the heart or its nerve mechanism. Hennen[2] reports a fatal internal hemorrhage from the deep epigastric artery in an old man who had been run over by a carriage. Superficial hæmatoma and suppuration may follow a simple contusion. The rectus tends to rupture more than the broad muscles of the parietes. Rupture follows a violent force applied to a normal muscle in extreme tension or a trivial injury to a degenerated muscle. The muscle should be sutured because of the subsequent danger of hernia. Treves[3] argues that the effect of a blow on the abdomen depends upon whether it is anticipated or not and upon the extent of the padding of fat on the parietes. When the blow is anticipated the muscles are instinctively contracted and the body abruptly bent, so that the viscera are provided with a firm but elastic shield, and are removed from danger. According to Makins,[4] of 8153 injuries treated at St. Thomas' Hospital, 292 involved the abdomen, and of these 89 were visceral ruptures.

The effects are manifested immediately, as shock, hemorrhage, and peritonitis; intermediately, as when peritonitis follows a perforation through a contused necrotic patch in the intestine, the patient having been apparently well for one or more days; and remotely, as adhesions, stricture of the bowel, etc., developing after a prolonged period. Disastrous results may follow blunt violence applied to pathological processes, as aneurisms, cysts, and abscesses.

Ruptures of most of the large intra-abdominal vessels have been recorded. Providing there be time, the abdomen should be opened and the hemorrhage checked. If the vessel be severely contused, the symptoms of hemorrhage may be postponed until sloughing of the arterial wall ensue. Thrombosis, embolism, or stenosis of the vessel may occur, and the part supplied by the affected artery may become gangrenous. Aneurisms may develop. Recently we examined a man who, some ten years since, received a severe blow in the right iliac region. He was considerably shocked, and within a few days a large tumor appeared at the injured point. The mass increased in size for several months, then remained stationary for a long time, and finally began to subside. He presented a stony swelling about the size of two fists, which we believe to be a cured aneurism of the iliac artery.

Of 13 aneurisms of the renal artery collected by Keen,[5] 6 were traumatic, and of these 2 were subjected to nephrectomy and recovered. The other 4 died at periods ranging from thirty days to four years after injury.

STOMACH. From its elasticity and its more protected position beneath the ribs the stomach is less liable to be affected by trauma than the intestines. The anterior wall is the most frequent site for rupture. "One case is reported in which operation was done on the fourteenth day; a tear 4 cm. long was found. The stomach contents had been walled off by a local peritonitis. Recovery took place. An incomplete separation and laceration of the mucous coat of the stomach is not uncommon. Ziegler reports a cyst which formed in the anterior wall of the stomach, probably from a contusion of the upper abdomen" (Scudder[6]). A tear of the mucous coat may exist opposite the breach in the peritoneum, the muscular tunic remaining intact (Devergie[7]). Shock, peritonitis, and gastrorrhagia are the symptoms. In 6 of 11 cases studied by Scudder[6] hæmatemesis was especially mentioned. In one case in which this symptom was absent there was a complete rupture near the pylorus. Of 11 fatal cases the longest period of life following the accident was fourteen hours.

INTESTINES. In Makins'[4] series of 89 visceral ruptures, 21 involved the intestines. Of 71 contusion of the abdomen, 20 per cent. had intestinal rupture (Bryant[8]). Of 80 analyzed by Scudder,[6] 36 were from horse kicks, 23 from carriage-wheel accidents, 13 from man kicks, and 8 from spent shells. Keenan[9] states that the forces producing rupture are sudden sharp blows and heavy lacerating forces. The former cause 70 per cent. and the latter 30 per cent. of all ruptures. As Bryant[8] has shown, the sharp blow usually produces a single tear, while crushes often cause several lacerations. To these we add abdominal concussion, as falls from heights or blows upon the back in which the abdomen is not struck. Curtis[10] concluded that the so-called rupture is really a contused lacerated wound, caused by a crushing between the vulnerating body and the bony parts behind. The possibility of rupture by concussion, however, must not be overlooked. Grieg Smith[11] cites two cases of rupture of the duodenum caused by blows on the back; in neither was there fracture of the spine nor any injury in front. Of 36 horse kicks of the abdomen, 35 had ruptured intestine (Chevasse[12]); of 25 histories of horse kicks, 24 had intestinal laceration (Keenan[9]). The most common causes, then, are kicks and car accidents.

Of the 116 collected by Curtis,[10] 112 were in the small intestine. Of Makins'[4] 21 cases, 16 were in the small intestine. Keenan[9] says the portions of intestine most frequently injured are the upper part of the jejunum and the lower part of the ileum, places where a movable portion of the gut is attached to a more fixed one. Makins[4] calls that portion of the abdomen below the umbilicus the "dangerous area," as he affirms it is here that, as a rule, the intestine must lie to be crushed against the spine. Scudder[6] believes 75 per cent. of intestinal ruptures are in the small bowel, the jejunum and lower ileum being injured most often, and that there is usually more than one rupture found. Makins[4] mentions but two multiple rents in his series. In one-tenth of Curtis'[10] cases the ruptures were multiple. In Makins'[4] cases the amount of actual fecal matter in the peritoneal cavity was very small. He calls attention to the experiments of Travers concerning the contraction of the muscular coats and the eversion of mucous membrane which tend to prevent the escape of the intestinal contents. Complete division of the small intestine has been recorded, no effusion of the contents following. One patient lived eight days, and, owing to the tight contraction of the circular fibres of each end of the divided gut, there was no escape of fecal matter.[13] Rehn[14] operated on a suspected case of perforation nine hours after injury, and found, instead of a perforation, a tetanic contraction of the intestine. Jordan,[15] while removing a ruptured spleen, noticed the small intestine still contracted from the injury received. One could conceive of the possibility of a traumatic intussusception, but of this we have seen no record. Turner[16] reports a volvulus in a boy seven years of age, who fell, striking against a pole. He was operated upon twenty-four hours later, and a mass of adherent twisted intestine found on the left side of the abdomen. Nowack[17] publishes four cases of peritoneal adhesions after abdominal contusions. Operation was performed in all; there were invariably adhesions between the parietes and the omentum, which involved also the colon and usually one or two loops of small intestine. We operated on a case of this character in which pus formed among the adhesions three months after the contusion. Symptoms of peritonitis may be delayed as long as five or ten days, until a contused area in the bowel has perforated, a necrosis following the contusion. Contusion of the gut alone may lead to peritonitis, the diminished vitality allowing the micro-organisms to penetrate the tissues. The following case illustrates this point: A kick on the left abdomen was received from a companion. The injury was considered trivial. Next day the patient complained of pain, and the third day vomited and took to bed. We saw him for the first time and operated on the fourth day. The ileum was adherent to the abdominal wall, and, together with the appendix, violently inflamed. There was no perforation. Keenan[9] cites the case of a boy who was kicked in the epigastric region. Nothing seemed to indicate a serious injury. Six days later he suddenly died. A perforation of the intestine was found.

Barker[18] details the history of an abdominal contusion, followed by stricture of the intestine and pernicious anæmia.

Van Zwalenburg[19] reports a sarcoma of the intestine in a child five years of age, who had fallen from a fence five months before, and was caught between two boards and held hanging on the abdomen. Albion[20] mentions traumatism as a cause in 2 of the 10 sarcomata of the intestine which he collected.

Small[21] reports 13 cases of traumatic appendicitis. We have operated on 3 patients who attributed their appendicial trouble to trauma. Fowler[22] considers traumatism scarcely possible as an etiological factor.

Contusion probably, and concussion undoubtedly, predisposes to hernia of the bowel through the anatomical rings and to prolapse of the various organs. The contents of a hernial sac may be damaged by a contusion.

Symptoms. The degree of shock is variable, and is independent of the severity of the blow. In Makins'[4] series 6 were profoundly and 8 lightly shocked. In 3 no mention was made of shock, and in 3 it was definitely stated to be absent. We recall a man who was so profoundly collapsed, following a run-over accident, that death was unhesitatingly predicted, yet when the shock subsided he speedily recovered. Keenan[9] studied 70 cases reported since 1893. He declares that shock occurs in 60 per cent. of abdominal contusions, and in about 80 per cent. of lacerations of the gastro-intestinal canal. Pain was mentioned in 93 per cent.; it was in no proportion to the amount of injury inflicted. Makins considers pain a constant sign, and rigidity and immobilization of the abdominal wall almost constant. In Keenan's series rigidity occurred in 84 per cent. He thinks it occurs without visceral lesion, as shown by cases mentioned by Adam,[23] Manly,[24] and one of his own. Hartmann[25] believes rigidity is an imperative indication for laparotomy, even though other signs are absent. Of 10 cases presenting this sign, 9 were successfully operated upon and distinct lesions found; the remaining case, refusing operation, died as the result of an intestinal perforation. Of 17 cases without rigidity and who were not subjected to operation, all recovered. One would think tenderness were constant. It was absent in 2 of Makins' cases.

Abdominal distention indicates peritonitis. Absence of liver dulness is rare. Makins[4] mentions but 1 case; it occurred in 2 per cent. of Keenan's[9] cases, and in 4 per cent. of those collected by Curtis.[10] Makins lays some stress on localized impairment of resonance, which, he says, is due to the effusion and plastic lymph producing early adhesions. More extensive areas of dulness are due to contraction and collapse of large segments of bowel, which almost always accompanies these injuries, but which does not necessarily mean rupture. Cellular emphysema occurred twice in Makins' collection. It indicates a lesion of the bowel beyond the limits of the peritoneal coat. Dulness in the flanks would indicate fluid in the peritoneal cavity, which might be serous, fecal, or sanguineous. Unlike perforation from ulceration, fecal extravasation is rarely great in rupture of the bowel, owing to the retraction of the muscular coat. Hemorrhage would hardly be sufficient to cause this sign, unless the mesentery or some other vascular structure be also torn. Tenesmus, with frequent desire to defecate, is sometimes encountered. Vomiting was observed in 83 per cent. of the cases studied by Keenan; it also occurred several times without rupture. Absence of peristalsis and a friction sound on auscultation are indicative of peritonitis. Rectal examination will detect a resistance in the vicinity of the rupture in some instances; this is due to the formation of adhesions around the laceration. Bright blood in the stools would point to a rent in the large bowel, and tarry stools to a lesion higher in the intestinal tract. The temperature, pulse, and respirations augment as a rule. An examination of the blood may contribute to the formation of a diagnosis in doubtful cases. Bloodgood[26] says examinations of the blood after abdominal contusions to ascertain the existence of shock, hemorrhage, or peritonitis are not sufficient in number to allow of any conclusions. The facies will be of value to the experienced observer. Rectal insufflation with hydrogen (Senn) or ether (Sutton[27]) is considered dangerous by many surgeons.

The signs and symptoms we discern are due to peritoneal infection, the very onset of which we should make an effort to recognize. Obliteration of liver dulness in a flat belly or resonance over the posterior and lateral area of hepatic dulness in a distended abdomen, and cellular emphysema are the only pathognomonic signs of ruptured intestine.

These are not due to infection, but are rare signs of rupture, not ulcerative perforation of the gut.

The occurrence of any of the above signs should make us suspicious, and suspicion should in most instances be synonymous with exploration. Keenan[9] quotes Manly,[24] Deaver,[28] Tillmans,[29] Shields,[30] and Battle,[31] who would watch for bad signs, and on their appearance operate. Lambert,[32] Rogers,[33] Laplace,[34] Balladur,[35] and McDonald[36] would perform immediate exploratory laparotomy in all cases of contusion. Keenan[9] maintains a position between these two. He would, while paying close attention to the symptoms, operate on the history rather than wait for a certain diagnosis. He quotes Kemisson,[37] who gives a person who has been kicked in the abdomen one chance out of three of dying, without operation.

Twelve years ago rupture of the intestine was regarded as mortal. J. Croft[38] reported the first successful operation for this injury in 1889. Angerer,[39] in the discussion on contusions of the abdomen at the German Surgical Congress, April, 1900, reported 9 cases of rupture of the intestine, with 2 recoveries. Of 162 cases not operated upon 11 recovered, and several of these had fecal fistula. In Makins'[4] series 15 were operated upon, with 3 recoveries, 20 per cent. The unoperated cases died. The prognosis will depend on other visceral lesions, the extent of the local injury, the previous condition of the patient, and the degree of emptiness of the bowel. A perpendicular blow is more harmful than an oblique one. Makins[4] believes rupture of the small intestine to be more dangerous, because it is movable, and because the fluid contents will pass out more readily and infect the peritoneal cavity. The contents of the large intestine often glide by the opening without escaping, and when they do escape it may be on the outer side of the colon or retroperitoneally, where a local abscess is more liable to form. Scudder[6] asserts that wounds of the duodenum and jejunum are less fatal than those of the lower ileum and colon, because the bacterial flora is more scanty than in the lower part of the intestinal canal.

If the symptoms point to dangerous hemorrhage operate at once, otherwise do not operate until reaction has been obtained (Da Costa[40]). Make a median incision below the umbilicus, as it will be near the injury, it may avoid the bruised parietes and it will permit of a satisfactory cleansing of the peritoneum (Makins[4]). Search for the rupture in a line from the seat of the surface injury back to the lumbar spine (Scudder[6]). You cannot be sure, however, of finding all the lesions unless the whole intestinal canal be inspected. Perforations have not infrequently been overlooked. Avoid evisceration and treat discolored spots as ruptures (Keenan[9]). If the injury be caused by a crush the peritoneal wound will be smaller than that in the inner coats. Be sure to reinforce all the peritoneum covering the lacerated mucous and muscular coats

(Scudder[6]). Suture longitudinal rents transversely (Angerer[39]). If resection be necessary, because of the severity of the contusion, extent of the laceration, or because of detachment or injury of the mesentery, employ the Murphy button to save time. In a recent case we packed off with gauze a coil of gut whose integrity we questioned. Wipe the infected area with a dry sponge and irrigate (Makins). Avoid drainage if possible. Moynihan[41] reports a case of complete rupture of the duodenum jejunal juncture. An end-to end approximation was impossible. The duodenum was therefore closed and the jejunum implanted in the anterior wall of the stomach with the aid of a Murphy button. The patient died on the one hundred and fourth day after operation, from perforation of the duodenum due to the Murphy button.

Vaughan[42] reports 3 cases of rupture of the intestine following contusion of the abdomen. Two were operated upon, and all 3 were fatal. Scudder[43] had under his care a man who was crushed between a platform and a moving car. On the sixth day a fecal abscess in the left iliac fossa was evacuated, at the extreme depth of which was discovered an opening into the descending colon. Later the fecal fistula was successfully closed. Fiske[44] narrates a similar case. Berg[45] successfully sutured a ruptured duodeno-jejunal flexure twenty-five hours after a run-over accident. Buchanan[46] reports a lacerated intestine following a blow from a pair of tongs. Recovery followed operation.

Elliott[47] operated on a boy who had been struck by a trolley-car fender, suturing a rent of the small intestine. Recovery ensued. Roestal[48] records an intestinal perforation from contusion in which shock was so great that no operation was performed. Later an abscess developed, was opened, and recovery followed. Taylor[49] relates a case of perforation from the kick of a gun. Operation was done two days after in the presence of a general peritonitis. Death occurred seven days after the injury. Turner[16] reports 2 cases in which operation was followed by recovery in 1. The fatal case was complicated with a torn pancreas. Myles[50] removed eight feet four and a half inches of gangrenous intestine following a contusion of the abdomen.

OMENTUM AND MESENTERY. The immediate danger is hemorrhage. Later the omentum may develop an inflammatory mass or contract embarrassing adhesions. Violent contusion of the mesentery or stripping of the mesentery from the bowel would cause intestinal gangrene. Le Conte recently operated on a case in which it was necessary to resect seventy-one inches of intestine because of a wound in the mesentery near the spinal column. Adventitious openings through which the intestine may become strangulated have been noted. Slit-like holes are due to injury, round holes are congenital (Treves[51]). Of 89 visceral ruptures 3 or 3.37 per cent. were of the mesentery and all the result of buffer accidents (Makins[4]). If the injury has not been to the hepatic or splenic area, if there be movable dulness in the flanks with other signs of internal hemorrhage, the diagnosis of ruptured mesentery or omentum may be assumed. Do not wait for the reaction that will never occur, but open the abdomen immediately and secure the bleeding vessels. Prolonged shock or secondary shock probably means hemorrhage. Mesenteric cysts may develop after an injury; they usually contain blood.

LIVER. Of 89 visceral ruptures, 16.85 per cent. were of the liver. The same general causes that produce intestinal rupture produce laceration of the liver. They may follow a fall on the feet from a height, and it has been said a sudden action of the abdominal muscles has caused it. Hewitt[52] says rupture of the liver has actually occurred from a vigorous application of artificial respiration. The right lobe is more frequently injured than the left; it may be completely divided. It is often accompanied by other visceral lesions. Of 543 cases of injury to the liver, more than one-half died of hemorrhage within twenty-four hours (Scudder[6]). Like other intraperitoneal hemorrhages, there is but little tendency for the bleeding to cease spontaneously. Pain is severe and shock profound. There are symptoms of internal bleeding, with movable dulness in the flanks. The hepatic dulness is increased. Pruritus and jaundice sometimes develop after twenty-four hours. Bile and sugar occasionally appear in the urine. Peritonitis frequently occurs in a patient who survives the initial shock and subsequent hemorrhage. Among the remote results should be mentioned abscess and diabetes. Operation is imperative to check hemorrhage. There are three methods of hæmostasis—suture and ligature, cautery, and the tampon. Sutures should be employed whenever applicable. They may tear out, may fail to stop bleeding, and the wound may be inaccessible. Then gauze packing should be utilized. Cauterization is not suitable for large wounds, and is liable to be followed by secondary hemorrhage. Vaughan[42] reports 2 fatal cases of rupture of the liver.

H. B. Delatour[53] reports 2 cases successfully treated by operation. Turner[18] reports a fatal case of ruptured liver and kidney following a blow from the pole of an omnibus.

Ruptures of the gall-bladder, cystic, hepatic, and common biliary ducts have occurred. Cholelithiasis would predispose to injury of the gall-bladder.

Van Schneppel[54] speaks of cholecystitis from trauma, gallstone being present. Garrett[55] reports a rupture of the hepatic duct following a fall on the abdomen. Recovery followed laparotomy and drainage. He mentions 6 other cases, and quotes Miles F. Porter: "The symptoms as they occur are pain, shock, ascites, acholia, jaundice, cholæmia, peritonitis, inanition. . . . Injuries of the common duct, when they result in complete diversion of the bile from the intestine, are inevitably fatal unless by some means the diversion be overcome." A large bile cyst sometimes forms. The proper channel may become re-established, as proven by cases that have recovered and by the experiments of Sir Benjamin Brodie, Tiedeman, and Gmelin. The gall-bladder should be sutured or removed according to the degree of laceration. It may be completely torn from its connections. From our reading we gather that incision and drainage are all that have been done for ruptured ducts. An anastomosis would be the ideal treatment.

SPLEEN. Splenic rupture is not as frequent as rupture of the liver. It occurred in 11.23 per cent. of Makins'[4] cases. An enlarged spleen is predisposed to injury. Owing to its secluded position beneath the costal margin, the overlying and protecting ribs are frequently fractured in traumatic lesions of this organ. Hemorrhage is the great danger, but is not as rapidly fatal as the vascularity of the spleen would lead one to suppose. This is due to the elasticity of the organ permitting retraction and to the fact that the blood in it coagulates rapidly, a large number of leucocytes being present. Abscess or peritonitis may follow. The symptoms are those of internal hemorrhage, with pain and tenderness over the spleen. The splenic dulness is increased. The dulness in the left flank frequently does not disappear when the patient is turned on the right side, owing to the fact that the blood is often clotted.

Do not wait for reaction. Some, however, maintain that there is a distinct reaction, and that its appearance should be seized as the favorable opportunity for operation, which consists of splenectomy, splenorrhaphy, cauterization, or packing with gauze. The choice of operation depends upon the condition of the patient and of the spleen. If the patient has lost much blood, if the spleen is large and extensively adherent, if the tear is favorably situated, suture is to be chosen. If the capsule is thin, the spleen soft, and the tear inaccessible, packing is to be considered. Ordinarily, with a normal spleen, particularly if the laceration is great, splenectomy is the best operation (Scudder[6]). Since 1890, 34 cases of splenectomy for rupture of the spleen have been reported, with a mortality of 41.2 per cent. Excepting cases of more superficial injury, splenectomy is the operation which will be resorted to in the future (Warren[56]). Jordan[15] says there are on record 135 cases of injury to the spleen; 5 healed spontaneously, 16 were saved by excision, and 104 died, 3 from abscess, and the rest from hemorrhage. Kellock[57] reports a splenectomy for an extensively lacerated spleen. Five days later the patient died with symptoms of obstruction, which were due to bruising of the small intestine a few inches above the cæcum. He cites a second case accompanied by a lacerated liver. The patient did not survive operation. Mixter[58] details the history of a successful splenectomy for rupture. The splenic artery was torn and spurting. There was dulness in both flanks, showing that the blood was not clotted.

PANCREAS. Uncomplicated rupture of the pancreas does not occur. That partial laceration without implication of environing organs takes place is evidenced by the pancreatic cicatrices revealed at autopsies. Slight hemorrhages are not infrequent after contusions in individuals with friable arteries or with pancreatic congestion from interference with the venous return. Pancreatic rupture is usually rapidly fatal from hemorrhage. Gangrene or suppuration often follows when the bleeding is not mortal. Some 17 cysts of traumatic origin are on record. It is likely that many of these so-called cysts are really collections of blood and pancreatic fluid in the lesser peritoneal cavity (Scudder[6]). Chronic pancreatitis may ensue. Robson[59] tells us that the pancreatic tissue is soft and easily bruised, so that, although it is well protected, yet a slight injury takes more effect on it than on many firmer organs. He mentions a case of acute hemorrhagic pancreatitis following trauma. The symptoms of laceration of the pancreas are those of shock and internal hemorrhage. The bleeding is checked by ligature, packing, or partial excision. It has been proven experimentally that the pancreas may be entirely removed and the animal live. This has not been proven in practice. Partial extirpation is proper as long as the canal of Santorini is left (Ceccherelli[60]). The escape of sterile pancreatic juice into the abdominal cavity does not necessarily mean peritonitis. When discharged externally through a fistula it digests the skin, but it is probably rapidly absorbed from the peritoneal cavity. Suppuration and gangrene should be combated by epigastric or lumbar incision and drainage. Cysts are to be marsupiated. Chronic pancreatitis is amenable to drainage, but here the drainage is indirect through the bile ducts after a cholecystotomy or cholecystenterostomy. The drainage causes a subsidence of the pancreatitis, then an opening of the common duct by relief of tension, and so to a cure of the patient (Mayo Robson[59]).

KIDNEY. Of 89 ruptures of the abdominal viscera 39.32 per cent. were of the kidney (Makins[4]). The kidney is well protected by its position and by an enveloping bed of fat, yet it is frequently injured. Rupture is rarely bilateral and is usually transverse to the long axis of the kidney. "If the kidney is simply contused, hemorrhage will take place within the kidney capsule; if the renal capsule is torn, hemorrhage will occur into the perinephritic tissues forming a pseudo-hydro-hæmatonephrosis; if the peritoneum is torn, it is possible for both urine and blood to accumulate within the abdominal cavity. Herzog finds that in falls and blows upon the lumbar region the hilus of the kidney is torn and that retroperitoneal hemorrhage is present. On the other hand, he finds that in crushes from the front the kidney is torn anteriorly and crushed, and that hemorrhage usually takes place into the general peritoneal space.[6]" Keen[61] says involvement of the peritoneum with rupture of the kidney is more frequent in childhood than in adult life, owing to the fact that the kidney is not separated from the peritoneum by fat, the perinephritic fat developing late.

Bilateral and occasionally unilateral injury of the kidney is fatal from anuria, the sound kidney refusing to act from some reflex cause. Of 198 cases, Maas[62] and Spencer,[61] 15 died of shock and secondary hemorrhage, 6 of secondary hemorrhage, and 1 of continuous hemorrhage. The symptoms are shock, pain, and hæmaturia. Hæmaturia was absent in 10 of the 189 cases; it was occasioned by a clot in the ureter, a thrombosis of the renal vessels, and a pre-existing stricture of the ureter. Extensive laceration of the pelvis of the kidney or complete separation of the kidney from the ureter would also explain the absence of blood in the urine. Newman[61] had a patient who had hæmaturia following a blow on the loin. No lesion of the kidney existed, the hæmaturia being due to a papilloma of the bladder. Hæmaturia may not appear until several days after the injury.

Hemorrhage and sepsis are the dangers. The symptoms of internal hemorrhage and an increasing tumor in the loin demand immediate exploration. Hæmaturia is an unsafe guide as to the extent of kidney injury. If on exploration the kidney be found hopelessly destroyed, or ligation of the renal vessels be necessary to control bleeding, the kidney should be removed at once, taking the chances of the existence and integrity of the opposite kidney. If but moderate laceration be present, disinfection and drainage or partial nephrectomy is indicated. If the evidence point to intraperitoneal bleeding or to lesions of the other abdominal organs, laparotomy should be performed and the kidney treated as before. The graver cases do not recover without operation. The surgeon should lean toward exploration in doubtful cases, and in severe laceration toward nephrectomy (Keen[61]). The statistics demonstrate that primary nephrectomy is much safer than a secondary nephrectomy after sepsis has appeared.

Many of the cases are mild, and of these many recover. They are treated by ice to the loin, internal astringents, and rest.

Turner,[16] Kellock,[57] and Mixter[58] each publish the notes of a successful nephrectomy for rupture of the kidney following trauma.

Ureter. Rupture of the ureter is caused by the vulnerating force pressing the ureter against the transverse process of the third, fourth, or fifth lumbar vertebra or by traction on the ureter. All ruptures are above the pelvic brim. Of the 23 recorded cases 5 had contracted ureters, with hydronephrosis after trauma. Two, Poland and Mackensie, were undoubtedly ruptures of the ureter.

Shock is not profound or persistent unless there be some injury to the other abdominal organs. A few drops of blood in the urine, with persistent pain and tenderness in the side, point to injury of the ureter. If the ureter be completely torn across a retroperitoneal accumulation of urine and blood will appear after several days. A differential diagnosis cannot be made between rupture of the pelvis of the kidney and ruptured ureter. Complete obstruction of the ureter will cause atrophy of the kidney; partial obliteration may result in a pyonephrosis or hydronephrosis. There is little tendency for spontaneous repair. If the injury be uncomplicated there is little danger to life. A tear in the peritoneum may lead to a fatal peritonitis. The symptoms are often delayed, due to the fact that a primary bruising subsequently ruptures through a necrosis of the ureteral wall.

Immediate anastomosis is the ideal treatment, but this has never, as yet, been done. Lumbar incision and drainage are indicated after infection has taken place; it would be difficult to find the ureter, and even if it could be found, failure would probably attend an effort at anastomosis. Aspiration of the retroperitoneal accumulation has been successful in some cases. Nephrectomy may be necessary as a secondary operation (Scudder[6]).

BLADDER. Rupture of the bladder is intraperitoneal, extraperitoneal, and combined extraperitoneal and intraperitoneal; simple or complicated. Laceration of the bladder mucous membrane, with hæmaturia, may follow a blow on the hypogastrium. Intraperitoneal rupture is due, in most cases, to the forcing backward of the distended viscus against the promontory of the sacrum, although in some cases it may result from contrecoup (Alexander[63]). Extraperitoneal rupture is often associated with fracture of the pelvis. In uncomplicated cases the rent is vertical and occurs at the upper and posterior part of the bladder. If the tear does not extend through the muscular tunic symptoms may be delayed until sloughing completes the perforation (Scudder[6]). Normal urine may come in contact with the peritoneum without producing infection, but when bacteria are present inflammation ensues in a very short time.

Alexander[63] tabulates 45 cases of intraperitoneal rupture of the bladder treated by laparotomy and suture, and 6 cases that were treated by abdominal section without suture. Of the former 23 died, 16 from peritonitis, of which 4 at least were due to imperfect suturing, 2 to shock, 2 to hemorrhage, one primary and one secondary, 1 to pneumonia, and 2 died on the table. Of the latter, 3 died. Without operation all hope must be abandoned. The first recovery after intraperitoneal rupture of the bladder was reported by Walters,[64] of Pittsburg, in 1861. He simply opened the abdomen and drained. The symptoms are shock, hypogastric pain, sensation of something having given way inside, rectal tenesmus, and an urgent desire to urinate, but inability to accomplish the act. The catheter reveals a little bloody urine or no urine at all; it may pass directly into the abdominal cavity. Cases have occurred in which unstained urine has been withdrawn from a torn bladder. This injection test is not infallible. In Alexander's[63] patient eight ounces of salt solution were injected and eight ounces were withdrawn, yet an intraperitoneal laceration four inches long existed. Air (Keen) or hydrogen (Senn) may be pumped into the bladder. Alexander says this inflation is useless when the intestines are tympanitic, and always dangerous because it spreads infection and adds to shock. Dulness in the flanks suggests intraperitoneal rupture, while unilateral tenderness and tumor point to rupture outside the bladder (Scudder[6]). Alexander maintains that it is not necessary to make a differential diagnosis, as both require immediate incision of the abdominal wall. He advises exploring the prevesical space through a suprapubic incision, and, if this is healthy, extending the incision upward, and so open the abdominal cavity. Treatment consists of early operation, cleansing the peritoneal cavity, and careful suturing of the tear, Extraperitoneal rupture is treated by drainage.

DIAPHRAGM. Vaughan[42] reports a left-sided rupture of the diaphragm in a man who was struck on the back by the débris from a blast. Death ensued in twenty-four hours. Almost the entire stomach had entered the pleural cavity. Walker[65] details the history of a strangulated hernia through a rupture of the diaphragm on the left side, following a blow from a falling tree. A knuckle of bowel about eight inches in length was withdrawn from the pleural cavity, and the rent in the diaphragm closed with catgut sutures. Recovery ensued. He quotes Bowditch, who studied 88 cases, and found the large majority to have occurred on the left side. This he believes to be due to the fact that the liver is on the right side, to the greater length and strength of the right crus of the diaphragm, and because two fibrous bands exist in the right side of the diaphragm that are not found on the left. Dyspnœa, intense pain, cough, thirst, and hiccough are mentioned as symptoms. The physical signs resemble those of pneumothorax. A tympanitic note over the area where prolapsed gut is situated, amphoric tinkling, and sometimes succussion sounds are present. Litten[66] describes a horizontal depression crossing the lower part of the chest and moving up and down during respiration, which, when present on one side, indicates air or fluid in the pleural cavity, or pneumonia. In ruptures of the diaphragm with hernia this phenomenon can be seen below the tympanitic area. There will be symptoms of obstruction if there be strangulation of the stomach or bowel. Leichtenstern claims that in only 5 out of 250 cases of diaphragmatic hernia was the diagnosis made before death. Walker[65] believes that in recent cases, if the diagnosis has been made early, laparotomy should be performed. In old cases, on account of the difficulty of reducing the gut, ligating the sac and stitching the rent in the diaphragm, the transpleural route is preferable. If after laparotomy the gut cannot be reduced a thoracotomy is justifiable.

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REVIEWS.

A SYSTEM OF PRACTICAL THERAPEUTICS. By Eminent American and Foreign Authors. Edited by HOBART AMORY HARE, M.D., Professor of Therapeutics, Jefferson Medical College; Physician to Jefferson College Hospital, etc., Philadelphia. New (second) edition, thoroughly revised. In three handsome octavo volumes, containing 2593 pages, with 457 engravings and 26 full-page colored plates. Philadelphia and New York: Lea Brothers & Co., 1901.

THE second volume of Professor Hare's *System of Therapeutics*, which deals with the treatment of fevers, skin diseases, the respiratory, circulatory, renal, and nervous systems, is divided into twenty-nine chapters, contributed by twenty-five well-known authorities, almost all of whom are teachers of the subject on which they write. Ten of the chapters are entirely new, the rest have been overhauled and carefully amended. It is written from a bedside stand-point, in lucid terms, which, though not dogmatic, are sufficiently positive and convincing to guide rather than direct. It is a work calculated to make the reader think; it contains exercises for his judgment; a drug is not recommended for a symptom, but the cause of complaint is diligently sought, removed if possible, and the effect is combated with an eye to the individual as well as to the disease. An effort is made to inculcate rational instead of routine treatment, to smooth ruts with reason, and to append to each recipe brains *quantum sufficit*. Hare well says that "the curse of therapeutics is the fact that physicians do not think for themselves, but blindly follow some method." Archaic procedures and untried novelties, with a few justifiable exceptions, are excluded.

Typhoid fever, pneumonia, and intestinal parasites are treated by the editor. He says of enteric fever that meddlesome therapeutics designed to abort or jugulate the disease is not only fallacious but baneful in practice; that the patient should be allowed to get well; that antityphoidal inoculations are practically futile; that the urine contains bacilli and should be disinfected, and that the diet should be more liberal. He controls fever with cold: sponging some, rubbing some with ice, and using the plunge-bath in others. He prays against the routine bath treatment, quoting Osler: "When I hear a poor fellow (who has been dumped, like Falstaff, hissing hot into a cool tub) chattering out maledictions upon nurses and doctor I am inclined to resent it and to pray for a method which may be, while equally life-saving, to put it mildly, less disagreeable." He quotes Keen on perforation, and hopes that diagnosis may so far advance that enterorrhagia may be arrested by abdominal section.

In addition to the remedies given for hiccough the reviewer has got gratifying results from strapping the diaphragm—*i. e.*, adjusting broad strips of adhesive plaster around the lower chest and upper abdomen to limit the spasm. We are sorry the complications are not dealt with more fully, as there is a sense of incompleteness when the end of the dissertation is reached.

Of pneumonia he writes that the value of oxygen is problematical; that antipneumotoxin is in the experimental stage and does not give results which would justify its use; that persons whose lungs are impaired in vital resistance should be forbidden to enter the room of a person suffering from this disease, and that the sputum should be carefully disinfected. A short time since we had the opportunity to observe a wife's devotion to a husband afflicted with pneumonia rewarded by a frank attack of pneumonitis; this is but one case, but it has left an impression.

Under the individual prophylaxis of malaria, by James M. Anders, we are advised to avoid night air, to sleep above the ground-floor of a dwelling, and to boil our drinking-water, but we find no reference to the anopheles or to mosquito-netting.

William M. Welsh describes the management of variola in the manner expected from so eminent an authority. In common with most therapeutists the author maintains that scarring can be prevented only by aborting the rash, and that of all the ectrotic measures advocated none is of any value, and many are distinctly harmful.

In treating varicella, rubeola, rubella, and scarlatina J. P. Crozer Griffith holds that every effort should be made to prevent other children contracting the disease, and that the physician should wear during his visit linen or rubber overclothing, should disinfect his face and hands before leaving the anteroom, and should not go directly from the house to those of other patients. This advice is sound but seldom practicable, and we fear our brothers will little heed it.

In discussing yellow fever D. T. Lainé states that it can be treated in a room without communicating the disease to non-immunes. He believes the infection is conveyed by means of emanations other than gaseous, the environs being infected and capable of producing yellow fever in others, but that it takes some days before the environment is thus capable of inducing the disease. The bacillus icteroides is asserted to be far from being accepted as the true germ of yellow fever. Sanarelli's serum appears to be of very doubtful value; the use of blood-serum of recent immunes, however, seems to have assumed a more favorable position. We should like to feel pretty sure of our benefactor before allowing his serum to traverse our veins. The cold bath is recommended for high fever and is contraindicated in the old, the very young, and the feeble. The culex fasciatus is ignored, perhaps because the book was in press before the conclusion reached by Reed, Carroll, Agramonte, and Lazear, that the mosquito serves as the intermediate host for the parasite of yellow fever, was published. Osler, however, says this conclusion is too positive from such scanty data.

The paper by Frederick A. Packard on tonsillitis, influenza, and acute articular rheumatism is written with the thoroughness and freshness characteristic of the author. He favors the view that rheumatism is an infection which frequently enters at the throat; that the salicyl compounds are specifics—shortening the duration of the attack, mitigating its severity, and lessening the complications.

Floyd M. Crandall details the treatment of diphtheria, spasmodic croup, rickets, mumps, and diseases of the mucous membrane of the mouth. He argues that the antitoxin treatment has passed from the realm of discussion to that of certainty, and advocates its use in every suspected case without waiting for a positive diagnosis. "The list of drugs in the pharmacopœia is long. For all it is claimed that they are of value in the treatment of one and the other of the ills to which our flesh is heir, yet few of even the most useful have been subjected to the same fierce criticism as has the antitoxin of diphtheria and still fewer have borne the ordeal as triumphantly." Post-diphtheritic laryngeal stenosis, admittedly rare, is absent both from the text and index.

Organic diseases of the heart is presented by W. H. Thompson. The Schott treatment within limits is fully indorsed. One does not get an adequate idea as to just what the Oertel treatment is. We are sure surgeons would take exception to treating suppurative pericarditis by tapping.

The value of the sections on gastric diseases by Thomas G. Ashton, and kidney diseases by N. S. Davis, Jr., would be greatly enhanced by an elaboration of the surgical therapeutics of these organs. The general practitioner wants to know what to do when drugs fail to control hæmatemesis, when lavage fails to cure gastrectasia, and when ulcer ventriculi resists all medical measures. We regret that early resort to exploratory laparotomy is not emphasized and urged in gastric cancer suspects, as it is the only hope, and not a forlorn hope, as many think; carcinoma of the stomach can be and has been cured by early excision.

There is an excellent exposition of the treatment of apoplexy, brain and spinal tumors, meningitis, cerebritis, and neuritis by Charles K. Mills. He refers to Dawbarn's method of treating cerebral apoplexy by sequestrating a large portion of blood in the limbs by means of the Spanish windlass, thus diminishing blood-pressure at the bleeding-point and favoring hæmostasis. In discussing the surgery of brain tumors he says: "Absolutely inviolable, then, are only the middle region of the base and its bordering convolutions—the corpora quadrigemina and the pons oblongata;" and writes concerning spinal tumors that antisyphilitic measures and operation are our only curative resources; the latter formerly dismissed as chimerical, absurd, or even cruel, now has an advocacy based upon at least a few striking successes; and gives space to Lamphear's operation for tubercular meningitis, which consists in opening and irrigating the meningeal cavity as the belly is flushed in tubercular peritonitis. Keen and Senn believe this procedure justifiable.

Wharton Sinkler gives an able disquisition on headaches and neuralgia, to which he appends a list of 127 remedies for these distressing symptoms. Trephining for inveterate headache, although mentioned in the text, is not included in this list.

The therapeutics of the liver and spleen, by John H. Musser, is well up to date and thoroughly practical; we note, however, the absence of calcium chloride in the treatment of the hemorrhage of jaundice.

The remaining contributions to this volume are : Dengue, by J. W. McLaughlin, who gives the micrococcus of dengue as the probable cause of this disease; Diseases of the Bloodvessels, by Frederick C. Shattuck, who fails to mention Meigs on endophlebitis; Nervous Diseases of the Heart, a highly interesting and instructive chapter by Sir Lauder Brunton, the only foreign contributor to this volume; Disorders of Sleep, an admirable article, by Hugh T. Patrick; Asthma, Bronchitis, and Whooping-cough, by Norman Bridge; Diarrhœal Diseases and Dysentery, by W. W. Johnson; Drug Habits, by F. X. Dercum; Locomotor Ataxia, Acute Infantile Spinal Paralysis, Myelitis, and Amyotrophic Lateral Sclerosis, by M. Allen Starr; Spasmodic Affections of the Nervous System, by Joseph Collins; Medical Treatment of Insanity, by H. M. Bannister; Hospital Treatment of Insanity, by Edward N. Brush; and the Modern Treatment of Diseases of the Skin, by Henry W. Stelwagon.

In looking over this book we are struck with absence of references in many portions and by the fact that there are only two prescriptions with eight and only one with nine ingredients; this in itself speaks eloquently for the volume.

We may sincerely commend this work to the profession, believing it to be eminently practical, flush with the times, and thorough, and because its text is interwoven with an "inordinate amount of common sense."

F. T. S.

RECENT OBSTETRIC LITERATURE.

HUMAN PLACENTATION. By J. CLARENCE WEBSTER, B.A., M.D. With 233 illustrations. Pp. 126. Chicago: W. T. Keener & Co., 1901.

IN the book under consideration the author gives the results of investigations covering a period of several years, accompanied by a bibliography.

He first considers the structure of the mucous membrane of the body of the uterus before impregnation, and then passes to a description of the decidua. He gives a synopsis of the descriptions published of the earliest embryos, especially that of Peters, of Leopold, and of Reichert. His observations agree in the main with Peters' description. He believes that pregnancy brings about a marked hypertrophy of preexisting embryonic cellular elements. Actual cell division can be distinguished in parts. He repudiates absolutely other views of this process, and pays his respects to the authors of these views by saying that their opinions must be entirely abandoned. He calls attention to the interesting fact that in the great mass of mammalians menstruation does not occur, but the fertilized ovum grows upon the normal unaltered mucosa. It is to be regretted that the author adheres to the terms "reflexa," "serotina," and "vera" in describing the decidua. His statements would be clearer if he would adopt the usage naming the decidua uterine, placental, or ovular. He thinks that the ovular decidua or reflexa has for its function to fix and steady the ovum during its early life while the placenta is being established. Its gradual disappearance is in harmony with this view.

In treating of the placental decidua or serotina, the syncytium comes up for consideration. He finds that in the uterine decidua or vera in the sixth week there is no trace of syncytium, when the latter is abundantly present on the placental decidua or serotina. The progressive changes in the decidua he ascribes largely to pressure of the uterine contents caused by the growing ovum. The epithelium on the surface degenerates and disappears, probably because of some influence of the fœtal epiblast. The theory of fatty degeneration he rejects.

As regards the relations of the ovum to the decidua, in the earliest pregnancy yet described the chorionic vesicle is embedded in the substance of the compact layer of the uterine mucosa, the epiblast forming a thick layer of trophoblast broken up by vacuoles and spaces. Syncytium is already forming where the cells are in contact with maternal blood. Villi develop as buds of fœtal epiblast. The statement of Duval is quoted, that the placenta in its origin represents a maternal hemorrhage, circumscribed or encysted by ectodermal fœtal elements. The villi do not extend into the mouth of a sinus, but are attached to the surface of the decidua.

A detailed description of the chorion at various stages of pregnancy follows, and it is noted that the intervillous circulation is largely independent of sudden changes in the circulation of the mother. Blood moves through the villi as a steadily advancing mass.

The separation plane of the ovum is mainly through the compact layer of the placental and uterine decidua in its middle or outer layer. In incomplete abortions the entire uterine decidua or vera may be left with or without the ovular decidua and villi. In these cases the separation plane extends only through the outer layer of the placental decidua. In the latter months, when complete abortion occurs, the ovum still separates mainly through the compact layers. The same is true in the late months of pregnancy and at full term, but owing to the thinness of this layer the separation often occurs through the junction of compact and spongy layers. After the complete delivery of the ovum the uterus has still attached to its inner surface the main thickness of the decidua which was present before labor began.

The author describes the placenta when expelled, and agrees with those who have studied the nature of placental infarcts. A chapter on the phylogeny of the placenta concludes the text of the book.

The illustrations are most of them reasonably clear. Some, however, are indistinct, and some are so small that a clear idea of the matter stated is not obtained from the illustration. Microphotographs are rarely clear when reproduced in half-tone. They require redrawing or careful strengthening to bring out the points especially desired. The presswork of the book is fairly good, but is not up to the best standard. It is to be regretted that the author's labors do not meet with more worthy illustration.

His view of syncytioma malignum is that its origin is decidedly a fœtal one. E. P. D.

A TEXT-BOOK ON PRACTICAL OBSTETRICS. By EGBERT H. GRANDIN, M.D., and GEORGE W. JARMAN, M.D. Third edition. Philadelphia: The F. A. Davis Co., 1900.

THIS work was originally issued in two volumes, and is especially designed to inform those interested in the practice of obstetrics. It gives a clear and rational exposition of modern obstetric knowledge, and is illustrated with a considerable number of pictures of greater and less value.

In its present form the work has been put into one volume and made of very convenient size.

The authors have decided views regarding methods of treatment, and express them clearly. Their subject-matter is worthy of a better dress, as some of the illustrations and the general appearance of the volume are not in keeping with its value. It is a useful and interesting book, and one which deserves its popularity with the profession.

THE OBSTETRIC CLINIC. By DENSLOW LEWIS, P.H.C., M.D. Chicago: E. H. Colegrove, 1900.

IN this volume the writer publishes from stenographic reports a series of clinical lectures upon obstetrics given at the Cook County Hospital, Chicago. In many branches of obstetrics his material has been ample, and he has presented a number of interesting cases. Much of the volume is in accord with recent knowledge upon the subject. The matter is published in a very cheap form, and does not reflect especial credit upon the mechanical maker of the book.

A MANUAL OF OBSTETRICAL TECHNIQUE. By JOSEPH BROWN COOKE, M.D. Philadelphia: J. B. Lippincott Co., 1900.

IN this little volume Dr. Cooke describes briefly the technique of modern obstetric practice, with especial reference to the practice of asepsis and antisepsis. Lists are given of needed supplies; printed blanks are reproduced for the definite information of the reader. The illustrations are from photographs, and are clear and good. The book will be useful to students and physicians. E. P. D.

UTERINE FIBROMYOMATA, THEIR PATHOLOGY, DIAGNOSIS, AND TREATMENT. By E. STANMORE BISHOP, F.R.C.S. Eng., President Manchester Clinical Society; Fellow of the British Gynecological Society; Honorary Surgeon Amcoats Hospital, Manchester, etc. With 49 illustrations. Philadelphia: P. Blakiston's Son & Co., 1901.

THIS is, perhaps, the best treatise on uterine fibroids which has yet appeared. It is a beautifully printed and illustrated book of 314 pages, most of the illustrations being full-page plates and many of them modified from Kelly.

In operative gynecology the teaching is thoroughly up to date, and reflects the latest thought of the world's greatest workers in this field. The text is divided into twelve chapters, in which the subject is considered under the following heads: I., Introduction; II., Anatomical Considerations; III., Symptomatology and Diagnosis; IV., Development; V., Secondary Changes; VI., The Rôle of Medicine; VII., The Rôle of Electricity; VIII., General Survey of Surgical Treatment; IX., Preparation for Operation; X., Technique of Operative Methods; XI., Post-operative Treatment; XII., Final Results. The best chapters are undoubtedly the second, third, fourth, and fifth. That on Development is to be particularly commended for the clear and interesting manner in which this difficult phase of the subject is handled. The fact that medical, electrical, and palliative measures are of but little or no avail in these cases is shown in the chapters on the Rôle of Medicine and of Electricity. This, and the advisability of early operation in the majority of these cases, is a thought which pervades the entire book.

In the chapter on the Technique of Operative Methods much stress is laid upon old and obsolete operations, but in a treatise of this kind, which must necessarily be somewhat historical, perhaps this is essential.

The author believes in early operation in these cases, and while admitting that cases which give rise to no symptoms are best let alone, and that a heavy responsibility rests upon one who advises resort to such operations as hysterectomy, he says that there is danger that we may forget the far greater responsibility which rests upon those who counsel delay until any operation which earlier might have been a simple and safe affair has become in consequence of their advice a most dangerous and risky proceeding, undertaken, indeed, as the only alternative to certain death or constant misery. J. B. S.

PROGRESSIVE MEDICINE. A Quarterly Digest of Advances, Discoveries, and Improvements in the Medical and Surgical Sciences. Edited by HOBART AMORY HARE, M.D., assisted by H. R. M. LANDIS, M.D. Volume II., June, 1901. Surgery of the Abdomen, including Hernia. Gynecology. Diseases of the Blood. Diseases of the Glandular and Lymphatic System. Metabolic Diseases. Ophthalmology. Volume III., September, 1901. Diseases of the Thorax and its Viscera, including the Heart, Lungs, and Bloodvessels. Dermatology and Syphilis. Diseases of the Nervous System. Obstetrics. Philadelphia and New York: Lea Brothers & Co., 1901.

THE second volume of *Progressive Medicine* for 1901 contains some most important contributions to that valuable publication. Dr. William B. Coley's section on the Surgery of the Abdomen, including Hernia, is a most complete résumé of the wonderful advances made in this ever-widening sphere of surgical activity. What adds especial value to the article is the frank expression of the author's own views on the various topics under discussion. Dr. Coley is foremost among the abdominal surgeons of the United States, and writes with authority on the subject. He has inserted numerous illustrations which elucidate most clearly the obscure points in the surgery of a region of which it is so necessary that a clear picture should be borne in mind. The discussion of the radical cure of hernia is very fully entered upon, and the increasingly favorable results of operations performed by the Bassini method or some of its modifications are advanced and contrasted with the unsatisfactory and unscientific methods of treatment by injection and other non-operative measures. Dr. Clark's discussion of Gynecology comes in as a valuable supplement to the article by Dr. Coley. Particularly interesting will be found the consideration of the origin of malignant growths, spinal anæsthesia in gynecological work, and last, but by no means least, the report of the author's own epoch-making researches on the origin, development, and degeneration of the bloodvessels of the human ovary, with his mechanical theory as to the production of the menopause. In view of recent developments in the study of the various pathological changes which affect the blood, Dr. Stengel's article upon the subject possesses great value. In no branch of medicine is more laboratory work or of a better character being done than in this, and it is a matter for congratulation that the subject is here presented in such a manner as to render it available to all physicians. Dr. Edward Jackson, in the section on Ophthalmology, discusses with especial length diseases of the conjunctiva and external apparatus of the eye. Considerable space is devoted to the description of the various toxic amblyopias about which there is at present so much discussion. He mentions cases of toxic amblyopia due to tea-drinking and to illuminating gas, and adds several further reports of cases due to the use of Jamaica ginger.

The volume for September, 1901, begins with Dr. Ewart's article on Diseases of the Thoracic Viscera and Bloodvessels. As might be expected, the largest amount of space is devoted to pulmonary tuberculosis, although influenza and pneumonia are fully entered upon. The author describes very minutely the treatment of diseases of the heart and bloodvessels by means of various baths, such as the Nauheim and the modifications of the Schott exercises. In the section on Dermatology and Syphilis, Dr. Gottheil's article will be found especially useful in its discussion of the differential diagnosis of skin lesions and in its able presentation of the new forms of treatment by phototherapy and radiotherapy. The many excellent illustrations which accompany this article are of great value. Dr. William G. Spiller's contribution on Diseases of the Brain and Nervous System will be read with much interest because of the clear and interesting manner in which the author considers the diagnosis of cerebral tumors and abscesses, and of the obscure lesions of the spinal cord. There are no classes of cases more difficult to the general practitioner than these, and Dr. Spiller's article will prove a very helpful one. In Obstetrics, Dr. Richard C. Norris remarks that the literature of the current year has not been characterized by the production of any papers of an epoch-making character; nevertheless, many contributions of great interest have been written, and from these he selects for especial notice those which deal with the subject of eclampsia and its treatment by saline infusions, and the papers dealing with anæsthesia during labor.

In our review we have necessarily confined ourselves to picking out those topics from the various papers which we considered particularly worthy of mention, but in each section it will be found that not only are these main subjects discussed, but collateral subjects are fully treated of also. To the specialist as well as to the practitioner such a series of articles is of inestimable value. J. M. S.

MILITARY HYGIENE. By EDWARD L. MUNSON, A.M., M.D., Captain Medical Department U. S. Army. New York: William Wood & Co.

IT is established that armies suffer much less from wounds and deaths incurred in action than from disease. The necessity, then, for a complete and accurate knowledge of military hygiene cannot be gainsaid. Heretofore such knowledge has been meagre, incomplete, and widely scattered. Dr. Munson has incorporated in his one volume all that a military surgeon is required to know of hygiene in its broadest sense.

Taking the recruit as the unit of the army, as the point of attack for all diseases, injuries, and illnesses, as the cause for all hygienic, dietetic, sociologic, and prophylactic means and methods, the author consumes almost a thousand pages in their consideration. The work is so complete that collateral reading is unnecessary.

The book consists of thirty-one chapters, each a complete treatise on a special subdivision of the general head. The treatment of each subject gives evidence of access to vast stores of statistics, practical knowledge, and experience. The conclusions are given tersely, and are often the well-earned result of eliminative personal experience. The lessons of the late Spanish-American war have been well learned, and if the author's advice is followed need not be repeated. The book is unusually well balanced, each subject receiving its merited attention. The methods advocated for maintaining the efficiency of the soldier, guarding him from sickness or disease, and rendering him a contented being, are easily employed and eminently effective. From its size the book will not often reach beyond the medical department, yet some of the chapters should be in the hands of every officer, medical or otherwise.

The Commissary Department would find interesting reading in the chapter on "The Ration." To the quartermaster we would refer the chapters on "Military Clothing and Equipment," "Camp Sites and Camps," "Post Barracks and Quarters." The chaplain would find interesting material in "The Habits of the Soldier as Affecting His Efficiency." The canteen is discussed at length, and in its best form commended. The commander and subaltern would greatly benefit by studying "The March in Campaign" and "The Development of the Recruit." The truth, forcibly told, in regard to the results of alcoholic and venereal excess might be of benefit if readily accessible in pamphlet form to the wayward private.

There is so much that is easy and practical of application, with results that would be beneficial both to the State militia and the regular establishment, that it is impossible to choose for special mention. The author's method of rendering the uniform water-proof is a suggestion that merits attention from a number of view-points. In this way the equipment could be lightened, the length of the march prolonged, and much physical discomfort avoided.

From the "Selection of the Recruit" to the end there is not a weak chapter in the book. The illustrations are well selected and executed, the index is complete, the print, as, in fact, the entire workmanship of the book, all that could be desired. W. H. K.

THE CHILD, HIS NATURE AND NURTURE. By W. B. DRUMMOND, M.B., C.M., M.R.C.P.C., Physician to the Western Dispensary, Edinburgh. New York: The Macmillan Co.

THIS little book, one of the Temple Primer Series, is intended, as the author states in his preface, merely as an introduction to the subject of the physical and mental development of the child. While the book is very limited in its scope and elementary in character, it serves the purpose well, and as a preparation for more pretentious works on child study, is well worth reading by anyone interested in the subject.

G. M. C.

PROGRESS

OF

MEDICAL SCIENCE.

MEDICINE.

UNDER THE CHARGE OF

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Typhoid Fever at the Royal Victoria Hospital.—PROF. STEWART (*British Medical Journal*, 1901, i., 1463) reports the results of the treatment of 620 cases of typhoid fever occurring during seven years ending December 31, 1900. The mortality for these years was 5.4 per cent. The comparison of the annual percentages of mortality based upon from 72 to 126 cases a year is a striking demonstration of the uselessness of any attempt to draw conclusions as to treatment in such a malady as typhoid fever from anything but really large numbers of cases. These percentages vary from 0 to 9.3. In 10 per cent. of the cases the onset was associated with rigors or chills during the first week; 32.25 per cent. of the deaths occurred from perforation; 29.41 from a general intoxication; 26.47 from hemorrhage.

Out of the 11 cases of perforation an operation was attempted in 8 without a successful result.

Stewart makes the observation that " a simple (non-perforative) peritonitis is not an uncommon event in typhoid fever, and may clinically closely resemble a perforative peritonitis. Recently we have had such an experience." In this case, in which, however, the condition of the peritoneum is not described, an exploratory operation was made from which the patient made a good recovery.

While leucocytosis was the rule it was entirely absent in some instances of perforation. It may also be present in conditions the other symptoms of which simulate perforation. It is believed " that with pain and tenderness in the abdomen coming on suddenly during an attack of typhoid fever (and in absence of other definite complications) a distinct leucocytosis, even without other signs of perforation, an exploratory operation is justified, even advisable, thereby obviating the dangers of a fatal issue from too great a delay."

In cases of hemorrhage the following measures are employed:

1. The patient is urged to keep as quiet as possible.
2. The foot of the bed is elevated.
3. Cold is applied to the abdomen by means of a Leiter aluminium coil.
4. Opium is given internally.
5. Food by the stomach is either greatly lessened or entirely stopped.

Neither ergot nor acetate of lead has been employed.

Seven cases of cholecystitis were met with; in one instance in which there was a pericholecystitis as well the result was fatal.

Relapses occurred in 9 per cent. of the cases.

Of 370 cases the Widal test was positive in all but 8. In 3 of these latter cases the course of the disease was very mild, terminating in the second week. In 2 instances the reaction was present as early as the third day; in 4 on the fourth day. Out of 96 cases the reaction was positive on the day of discharge in all but 6. In 4 cases after a period of six months the reaction was positive with a dilution of 1 : 20, and in 7 the reaction was positive with the same dilution after a year; in six cases the reaction was positive after two years, and in 2 cases after three years. In 10 cases discharged a year previously reaction was negative. In 4 cases after two years and in 4 cases after three years it was also absent.

The striking case of typhoid fever without intestinal lesions, reported by Nichols and Keenan (*Montreal Medical Journal*, vol. xxvii., 9), is again discussed.

In all these hydrotherapy has been the routine treatment. The first bath is administered after a temperature cooled from 90° to 80° for ten minutes; the second at a temperature from 85° to 75° for a similar period, and the third at the same temperature for fifteen minutes; the fourth and subsequent baths are given at 80°, quickly lowered to 70° for a period of fifteen minutes. The usual precautions are taken as to friction, etc. The bath is repeated every third hour while the temperature remains above 102.4°.

About 83 per cent. of the cases were bathed throughout the course of the disease. Of the 17 per cent. who were not bathed, some few were patients who rebelled against the treatment; in about 5 per cent. the temperature never reached the bathing point; in about 1 per cent. the reaction was so bad that the continuance of the treatment was deemed inadvisable, while a few cases admitted as late as the third week of the disease were not bathed. Severe abdominal complications, such as hemorrhage, perforation, cholecystitis, and intense nephritis, necessitated the discontinuance of the baths.

SURGERY.

UNDER THE CHARGE OF

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What I Have Learned from One Hundred and Sixty-one Operations for the Relief of Senile Hypertrophy of the Prostate Gland.—HORWITZ (*Philadelphia Medical Journal*, June 22, 1901) states in conclusion: 1. Success following the Bottini operation depends on having perfect instruments, a good battery, the necessary skill, and the employment of a proper technique. 2. In suitable cases the Bottini is the safest and best radical operation thus far advised for the relief of prostatic hypertrophy. 3. It is often very efficacious in advanced cases of obstruction as a palliative measure, rendering catheterism easy and painless, relieving spasm, lessening the tendency to constipation, and improving the general health. 4. It is of especial service in the beginning of obstructive symptoms due to hypertrophy of the prostate gland, and may be regarded as a means of preventing catheter life. 5. It is indicated in all forms of hypertrophy except where there is a valvular formation, or where there is an enormous overgrowth of the three lobes, associated with tumor formation giving rise to a pouch, both above and below the prostate gland. 6. Where the bladder is hopelessly damaged, together with a general atheromatous condition of the bloodvessels, associated with polyuria, results are negative. 7. Pyelitis is not a contraindication to resort to operation. 8. The character of the prostatic growth has no bearing on the results of the operation. The ligation of the internal iliac arteries for the relief of hypertrophy of the prostate gland, first recommended by Bier, has been tried by several surgeons with very unfavorable results. The benefit derived from the operation is slight, and the mortality higher than that following prostatectomy. Thus far the results derived from angioneurectomy have been negative. The author has frequently witnessed the operation of perineal prostatectomy when performed by others, and has on various occasions resorted to it, but he has found that nothing was gained beyond the temporary improvement that might naturally be expected to follow rest and drainage. These methods have, therefore, not been employed in the cases referred to in this paper.

Amputation Through the Hip-joint, with a Synopsis of Two Hundred and Sixty-seven Cases in which the Author's Method was Employed.—WYETH (*Journal of the American Medical Association*, May 18, 1901) states that the 267 cases may be classified into three groups: 1. Neoplasms, including sarcoma, carcinoma, epithelioma, and one case of elephantiasis, and probably one osteoma. 2. Septic infections, including pyogenic osteitis or osteomyelitis, tuberculous osteitis or osteoarthritis, gangrene, cellulitis, and ulcer. 3. Injuries, with or without pyogenic infection.

In the group of amputations at the hip for neoplasms, all of which were malignant in character—with the exception of one case of elephantiasis and one of osteoma—there were 131 cases of sarcoma, 5 of epithelioma of the soft parts, and 1 reported as osteocarcinoma. None died in this group, excepting 14 fatal cases of the subdivision of sarcoma, giving the rate of mortality in disarticulation at the hip for sarcoma as 10.6 per cent., while for the whole group of 137 cases the death-rate was 10.2 per cent. Of the fatal cases, 1 died as the result of a severe hemorrhage immediately before the operation, which was practically hopeless when it was undertaken; 1 from tubercular peritonitis on the eleventh day; 1 from septicæmia on the twenty-sixth day; 1 from asphyxia of unknown origin on the twelfth day, and 10 died from shock after the operation.

Under the heading of septic infection, 94 hip-joint amputations were made; they are classified as follows: Pyogenic osteitis or osteomyelitis—not tuberculous—36, with 5 deaths, a mortality ratio of 14 per cent.; tuberculous osteitis or osteoarthritis 41, with 4 deaths, or 9.7 per cent.; gangrene—moist and diabetic—12, with 6 deaths, or 50 per cent.; general cellulitis 3, with 1 death, or 33⅓ per cent.; ulcer from breaking down of an extensive cutaneous surface 2, with recovery; total for septic infections, 94 cases, of which 16 died, or 17 per cent. Practically all the fatal cases were in a condition of great exhaustion due to prolonged sepsis, or they died from causes not directly referable to the operation. Of the 5 fatal cases in the first group, 1 was in such a seemingly hopeless condition that the operation was not advised. The second case was almost equally emaciated and anæmic from prolonged septic absorption. A third fatal case was complicated with a fracture which had existed for several months before the operation, while a fourth died of cerebral apoplexy on the tenth day, the cause of death not being referable to the operation.

For tuberculous osteitis and osteoarthritis—or hip-joint disease—4 out of 41 died, or 9.7 per cent. There were no serious complications in these 4 fatal cases, although they were weakened by the prolonged sepsis and waxy degenerations which are characteristic of tuberculosis in the bones. The operation was undoubtedly the immediate cause of death in each of these.

In the case of gangrene, as one would naturally suppose, the death-rate was exceedingly high, 6 of the 12 ending fatally; 1 died from shock; 1 from hemorrhage after the removal of the tourniquet; one from pneumonia; two from septicæmia, and 1 from cerebral embolism at the end of the second week after the operation; 1 case of cellulitis died out of 3 from anæmia and septicæmia. In the third group, injuries with or without septic infection, there are 36 cases with 23 deaths, a mortality ratio of 63.9 per cent. Twenty-four disarticulations at the hip were performed on account of extensive injuries to one or both lower extremities by railway trucks or heavy machinery. Of these 16 died, a mortality ratio of 66.6 per cent. When we consider the character of these injuries and the unfavorable conditions to which the patients were subjected, this high rate of mortality is not surprising. Hemorrhage more or less severe occurred in all cases, and it was difficult, and at times impossible, to overcome the shock which supervened. It is more than probable that had the intravenous injection of a saline solution been made before all of these were subjected to operation the ratio of mortality would have been decreased, since the majority of the fatal cases died in shock and before septic infection was observed.

Idiopathic Abscess of the Kidney.—CABOT (*Boston Medical and Surgical Journal*, June 6, 1901) states that abscess of the kidney may be due to (1) injury; (2) by the direct extension of inflammation from contiguous parts; (3) by the extension of an inflammation from the pelvis of the kidney into the substance of the organ; (4) infection through the blood. Suppurative inflammations induced in the kidney by organisms brought to that organ by the blood are extremely rare, excepting those abscesses due to the action of the tubercle bacilli. The author reports the case of a man, aged thirty-one years, who had an intense septic process in one kidney, which was due to a pure culture of the colon bacillus. Immediate operation being decided upon, the affected kidney was incised, the abscess evacuated, and drainage tubes introduced. Cultures taken during the operation showed the pus to contain a pure culture of the bacillus coli communis. The patient made an uninterrupted recovery. It was impossible to discover the precise manner in which the infection occurred. There was no evidence to indicate a probable primary source of infection. In the absence of any external lesion through which micro-organisms might enter the circulation, it is plain that one must suspect the alimentary canal of having afforded somewhere a weak spot through which the colon bacilli effected an entrance into the bloodvessels. When the diagnosis of an acute septic process in the kidney is established the pus should immediately be evacuated. In every case of doubt it is justifiable to explore the kidney by an incision. If an abscess is not found, but only a tense, congested kidney, an incision of the capsule along the convexity will afford, usually, great relief. If there is any question of the existence of a calculus the exploratory incision will afford opportunity for a thorough search and for the removal of the stone if one is found. If the kidney is movable and suffering from congestion or intermittent hydronephrosis, induced by the twisting of the vessels and ureter, it can be drawn up and stitched in the loin. Thus the operation offers promise of relief in each and every one of the conditions which is likely to give rise to similar symptoms. It has little or no danger attaching to it, and if an abscess is found the operation done early will stand a far better chance of cutting short the septic process than it would if it were kept as a last resort.

The Topical Treatment of Focal and Jacksonian Epilepsy.—WHITE (*University of Pennsylvania Medical Bulletin*, June, 1901) states that in cases of idiopathic epilepsy and pseudo-Jacksonian epilepsy operation is contra-indicated. In the true focal or Jacksonian cases the results of operation, while more encouraging than in the other class of cases, are not sufficiently so as to justify one in ignoring the greatly increased risk and the post-operative paralysis following excision of the epileptogenetic centre, without which the trephining becomes an incomplete and unsatisfactory operation.

The author's method is as follows: The affected centre is of course determined in advance by the most careful study and observation of the case. Its relation to the cranium is indicated by a silver or iodine mark upon the shaven scalp two days before the operation. The scalp is sterilized and resterilized three times, at intervals of twelve hours, not only before the trephining, but also before each subsequent application of the treatment. A horseshoe-shaped flap is raised, and a half-inch button of bone removed with a small trephine. The dura is left intact. Thirty minims of a sterile 2 per cent. solution of eucaine are then injected into the brain substance at the centre of the trephine opening, the point of the needle being introduced about three-quarters of an inch. The needle is gradually withdrawn as the last ten minims of the solution are injected. The flap is replaced. The patient is returned to bed, and on the day of the operation and the following day should receive full doses of bromides. At intervals, the proper length of which can only be determined by experience, the scalp having been sterilized as above, the injection is repeated. The patient should be kept in bed at least four hours after each injection, and should take bromides for from one to two days. The author reports two cases, and states that it is apparent that they cannot be said to establish even the entire safety of the procedure. In one of the cases convulsions of marked severity followed one of the injections. Neither can it be said that the results obtained were noticeably better than have seemed to follow other methods of operative procedure. It still seems, however, that there are possibilities of benefit by this line of treatment which justifies the author in placing it conservatively, as he has tried to do, before the profession.

The Results of Trendelenburg's Operation for Varicose Veins in Fifty-seven Lower Extremities.—RAMSAY (*Intercolonial Medical Journal of Australasia*, April 20, 1901) states that this operation consists simply in the division of the internal saphena vein just below the saphenous opening after the application of ligatures above and below the point of division, The author reports the results of his operations two years after they were performed. In sixteen cases the double operation was performed either at one time or subsequently. The internal saphena was ligatured in all the cases but one; in this the external saphena was ligatured with very satisfactory result. In two cases both the internal and external saphena were ligatured. The site usually chosen for the operation is an inch or two below the saphenous opening. In three of the cases the site was the middle of the thigh, with a good result in each case. In two other cases the operation was performed three or four inches above the knee, with a fairly good result. Unless the wound becomes septic, there is not much risk of embolus, but if it does there is also the added danger of pyæmia. The vein is best reached by a transvere incision, and medium-sized silk was found to be a satisfactory ligature material. In two cases the vessel was simply ligatured and not divided. The patients were generally kept in bed for a week after the operation, and allowed to walk on the tenth day. Where ulcers were present they were kept at rest until the ulcers had healed. In fourteen limbs, in addition to the Trendelenburg operation, several bunches of varices, small venous cysts, patches of fairly recent thrombosis, and superficial varices, in places very liable to injury, were excised at the same time. In two limbs these portions were excised after the Trendelenburg operation had not improved the condition of the veins. Of the forty-one cases, eighteen were males and twenty-three females. The results were: Not traced after six weeks in 4 cases; very successful result in 24 cases; successful result in 13 cases; symptoms cured, veins persist in 2 cases; great temporary relief and finally improved in 7 cases; ulcer forms after two and two and one-half years in 2 cases; unsuccessful and ulcer unimproved in 5 cases. Roughly, it may be said that 75 per cent. are successful; 10 per cent. are unsuccessful; 15 per cent. are doubtful, but 10 per cent. of these undoubtedly are improved, and the rest are practically well for two and two and one-half years.

The Technique of Bloodless Work.—DAWBARN (*Journal of the American Medical Association*, February 9, 1901) states that every drop of blood saved is a safeguard against shock, and bloodless work permits the same speed and facility of dissection that one could employ on the dead body. The present method in general use consists in stripping, "milking," by the fingers for some minutes the blood out of the elevated limb by massaging along the course of the chief veins. Then, at the desired point, is applied the constriction, which is either an ordinary stout rubber bandage or a very large rubber tube. In consequence of the simple milking a small amount of blood remains in every vessel. These are not paralyzed, as in cases where the Esmarch bandage has been used, hence there is small tendency to oozing in the wound and the severed arteries may be located with ease. The scalp may be rendered bloodless by the use of a tube carried tightly about the head. This rests in front of the depression between the frontal eminences and the superciliary ridges, at the sides runs just above the ears and behind is fastened just below the inion. In operations on the female breast the work may be made almost bloodless by cording the breast at the body, first passing through the space crosswise a pair of long mattress needles, to ensure against the tube slipping off. In operations about the bladder or perineum the Trendelenburg posture secures by gravity a degree of anæmia which constitutes a great safeguard in addition to other advantages resulting from this position. Constricting the extremities enables one to do comparatively bloodless surgical work on the trunk, face, neck, or brain, and it is worthy of more frequent usage than at present. It is also unquestionably the best means of treating hemorrhage where direct mechanical control is out of the question, as in hæmoptysis, etc. Applying the bloodless method to the surgery of acute injuries an excellent plan is that devised by Gerster. This method is useful for the reduction of the swelling following severe traumatism, and enables the surgeon to make an accurate diagnosis in injuries to the extremities. It consists in the anæsthetization of the patient, the application of the rubber bandage slowly but firmly from the end of the limb to the trunk. This is left on for fifteen or twenty minutes, then undone from below, but the final turn or two is left in place, examination will then show the swelling to be entirely gone. The bloodless method may also be applied to tonsillotomy by passing with a semi-circular needle a purse-string suture through the base of the tonsil. Bloodless work may also be applied to starving malignant growths supplied by the external carotids.

The Treatment of Goitre.—Kocher (*Medical Press and Circular*, May 8, 1901) states that he has performed excision in 1000 cases with the result of only four recurrences. The mortality in normal goitre has been 4 per cent., which includes one death from chloroform and one from cachexia strumipriva. No cases became infected. The dangers of the operation may be distinctly lessened by avoiding general anæsthesia and using Schleich's method of cocaine anæsthesia. As regards non-operative treatment of goitre, that by iodine still plays a useful part in spite of the highly praised and more recently introduced thyroid treatment. Iodide of potassium is to be given with caution, and the thyroid preparation even more so. The author has returned to the old treatment, and advises the use of from six to eight grammes of sodium phosphate daily. The hyposecretion of the goitre is increased by sodium phosphate, and thus diminution in size takes place.

PEDIATRICS.

UNDER THE CHARGE OF

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The Treatment of "Growing Pains" by Aspirin—J. A. Hale (*Pediatrics*, July 15, 1901, p. 50) follows the most recent opinions as to the rheumatic nature of so-called "growing pains." He has found salicylic acid to be efficient, but often needed in doses that produce distinct toxic symptoms. Salicylate of sodium is objectionable for the same reason, but to a less degree. Both drugs are decidedly irritant to the stomach. Of the newer substitutes for these drugs aspirin has given very satisfactory results, even superior to those of salophen, which is very much better tolerated by the stomach than either salicylic acid or its sodium salt. Aspirin is produced by the action of acetic acid anhydride upon salicylic acid. It undergoes little or no change in the stomach, but is decomposed in the small intestines, liberating the salicylic acid in a nascent state, and leaving the acetic acid to combine with alkalies present to form the beneficial compounds of sodium and potassium acetate.

Stricture of the Œsophagus following Typhoid Fever.—W. O. Roberts, of Louisville (*Pediatrics*, July 1, 1901, p. 15), reports a case of œsophageal stricture following typhoid. According to statistics this is one of the rarest of the sequelæ of the disease, which, according to Keen's collection of 1700 cases in his monograph on *The Surgical Complications of Typhoid Fever*, has been reported only twice. The patient, a boy, aged fifteen years, had suffered from a severe attack of fever, confining him to bed for nine weeks, during which time the diet had been exclusively liquid. Just before he began to sit up, in attempting to swallow a capsule of quinine, he choked, and had considerable difficulty in finally swallowing it. Since then up to the time of reporting he was unable to swallow any solid food. The smallest sized bougie was stopped at a point about twelve inches below the teeth.

The author states that this is the third case of post-typhoid stricture of the œsophagus that has come under his observation.

The Iodide of Arsenic in the Bronchitis of Childhood.—R. SAINT-PHILIPPE (*Revue mensuelle des Maladies de l'Enfance*, July, 1901, p. 337) refers especially to a type of bronchitis observed quite often among rhachitic or lymphatic children which he designates as emphysematous bronchitis. Apart from the usual signs of bronchitis there is marked dyspnœa, which is aggravated toward nightfall and by the slightest movement, but this is distinguishable from true asthma by the presence of dry or mucous râles. This form of bronchitis is developed usually by some infectious process aided by the diathetic predisposition. Under these conditions the bronchial catarrh induced by the infectious disease, such as diphtheria, influenza, typhoid fever, measles, whooping-cough, or bronchopneumonia, shows little tendency to resolution, and by its delay leads one to suspect the presence of tuberculosis. Most of the children affected with this tenacious bronchitis show the signs of the lymphatic or scrofulous temperament. Some are flabby, indolent, and suffer from eczematous eruptions upon the face, from blepharitis, or coryza, with hypertrophy of the upper lip—in a word, the strumous facies. Others are pale, delicate, and have scrofulous or gouty antecedents; while a third class brings a new element into play in the close relation manifested between efflorescences of the skin and bronchitis, and almost all of these suffer from dyspepsia and gastro-intestinal auto-intoxication.

In such cases the author thinks that the iodide of arsenic is especially applicable. The iodine acts beneficially upon the diathetic condition as an alterative and depurative, and locally upon the circulation and secretions of the whole respiratory tract, while the arsenic supports and stimulates the entire organism. Numerous clinical observations bear out the value of this treatment. Mixed with food this drug is easily borne and is almost tasteless. It is given preferably in water or wine during the meal, or to young children in the milk. It should not be given to children with disturbance of the stomach, lest it aggravate the trouble.

The iodide of arsenic is easily prepared provided the solution is kept cold to prevent the precipitation of hydriodic acid. The formula used is 30 centigrammes of iodide of arsenic to 30 grammes of distilled water. Of this 5 drops may be given at each meal, the dose to be increased by 1 drop morning and evening until 15 or even 20 drops at a dose are taken at each meal. This maximum dose should be continued for about a month, and then gradually decreased in inverse order to 5 drops again. After a rest of eight to ten days the course should be repeated in the same manner as before.

Acetanilid Poisoning by Absorption from External Wounds.—MANASSES (*International Medical Magazine*, 1901, vol. x., No. 5) reports two cases, one in an infant, aged six weeks, the other in a child, aged two and one-half years. The first had a dermatitis of the buttocks due to irritating passages, the skin being cracked and abraded. A powder containing equal parts of acetanilid and subgallate of bismuth was dusted over this surface. Within the next twenty-four hours the child developed subnormal temperature, cyanosis, and other symptoms of acetanilid poisoning. Recovery followed the use of hot baths with whiskey internally.

In the second case the same dusting powder was used for a scald of the buttocks. The local effects were very satisfactory, but on the second day the child complained of coldness, and the lips, ears, and finger-tips were cyanotic. These symptoms lasted for two days, gradually disappearing under the administration of a mixture of strychnine, ammonia, and brandy.

The Coincidence of Rheumatic Endocarditis with a Congenital Heart Lesion.—HALLÉ and ARMAND-DELILLE (*Archives de Médecine des Enfants*, 1901, vol. iv., No. 5) report the case of a boy, aged three years, who had always been healthy before the attack of acute articular rheumatism involving ankles and elbows. Attention was drawn to the heart by the rapidity and intensity of its action. At the apex was heard a systolic murmur, transmitted to the back. The area of cardiac dulness extended to the right border of the sternum; the lungs were normal. Death occurred in the third week from cardiac failure after several hours of severe progressive dyspnœa and cyanosis. At the autopsy the heart was found to weigh 180 grammes; the mitral valve was much thickened and presented fresh vegetations, and the foramen ovale was patulous and as large as a one-franc piece.

The case is remarkable for the previous absence of cyanosis or any functional disturbance due to the congenital defect, and for the rapidity with which the terminal symptoms ensued. The case illustrates the rule recently formulated by Marfan: whenever an acquired endocarditis in childhood presents very grave symptoms it is necessary to suspect that it does not exist alone, but is accompanied either by pericarditis or a congenital anomaly of the heart.

The Feeding of Diphtheria Cases.—R. G. KIRTON (*The Lancet*, June 15, 1901, p. 1666) emphasizes the great importance of feeding in this disease, a task that is often attended with the greatest difficulty owing to the inability of many patients to take or retain nourishment by the mouth. Feeding may be carried out by (1) the mouth; (2) the nasal tube; (3) the rectum, and (4) subcutaneous injections. In all cases, when practicable, food should be given by the mouth. Certain conditions, however, render mouth feeding impossible or inadvisable. Chief among these are the following: (1) Inability to swallow owing to pain or faucial swelling; (2) some cases of regurgitation; (3) entrance of food into the larynx in spite of slow and careful feeding, indicated by the patient's coughing when fed; (4) in certain cases, owing to struggling, the time taken and the exhaustion consequent upon the mouth feeding; and (5) continued vomiting—(*a*) vomiting which may be present almost from the onset of the disease; (*b*) early vomiting, commencing about the middle or end of the second week; and (*c*) late vomiting, which occurs after some weeks. It is well to remember that cases occur in which patients can be fed with a nasal tube without vomiting, although they vomit when fed by the mouth.

Nasal feeding can be performed with a soft rubber tube, but occasionally a stiff tube is necessary. Generally an interval of four hours is advisable, but this must depend to a certain extent upon the individual case. Milk peptonized, if necessary, or combined with a cereal food should be the chief ingredient. Raw meat juice, eggs, cream, brandy, or medicine may be added. The quantity must vary with the age, size, etc., of the patient. About four ounces is often as much as a child of from three to five years old will be able to retain and absorb, and even this may need to be reduced. All food should be strained, measured, and given warm. If vomiting occur it may be due to the amount or contents of the meal or to the frequency of administration. If after various changes the vomiting persists, rectal alimentation must be resorted to. It is worth noting that after the first few trials nasal feeding becomes as a rule remarkably easy, owing to the effect of habit, and in some cases to actual loss of sensation.

Rectal alimentation should be resorted to when feeding by the mouth or nose fails or is insufficient. A funnel and a soft rubber tube passed as far up the rectum as possible is preferable to the ball syringe, and the fluid should be allowed to flow in by the force of gravity alone. The food should be given warm about every four hours, and should be preceded about an hour by a feeding of three or four ounces of warm water given in the same manner as the milk feeding. [Physiological salt solution is to be preferred to plain water for this purpose, as it is less irritating to the mucous membrane of the bowel.—ED.] The bowel should be irrigated every twenty-four hours, and it is possible from this to get some idea as to whether the food has been absorbed. The quantity of food thus introduced should depend upon the age of the patient. In young children it varies from two to four ounces. Peptonized milk is the basis of the feeding, and often is the only constituent. Raw meat juice, white of eggs, and occasionally yolk of eggs may be added. In some cases brandy may be added to the milk, and can be tolerated usually for a long-continued period. It may, however, provoke a diarrhœa, and thus may be better tolerated if given apart from the feeding and diluted only with water. Large rectal feedings are inadvisable, since from their bulk they are not long retained and are more apt to set up diarrhœa than the smaller quantities. Diarrhœa is a troublesome and serious complication in these cases, for rectal alimentation has to be depended upon to support life over far longer periods than is usually supposed possible. If the feedings are not retained or only retained in part, their amount should be diminished, their frequency lessened, or some ingredient of the mixture, *e. g.*, brandy, omitted. Sometimes washing out of the bowel and giving it a rest for a time is useful, or starch and laudanum enemata may be required.

In addition to the forms of feeding described the subcutaneous injection of sterile horse serum is to be recommended. This serum should be used when the amount of nourishment taken by the stomach or rectum, or both, appears to be insufficient to support life. Sometimes it offers the only means of feeding the patient, owing to continued vomiting and diarrhœa. If given over a prolonged period, 20 to 40 c.cm. are often as much as it is advisable to inject daily. The only possible indication against the use of these injections is hemorrhage into the subcutaneous tissue adjoining the site of injection. The author, however, has observed no dangerous effects from its use, either from these hemorrhages or other causes.

THERAPEUTICS.

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Fate of Antipyrin in the Body.—DR. D. LAWROW finds that antipyrin appears in the urine in the form of a double glycuronic acid, in which antipyrin itself is probably held in the form of an oxy-antipyrin.—*Zeitschrift für physiologie Chemie,* 1901, vol. xxxii. p. 111.

Poisoning by Aspidium.—DR. W. GOTTHILF was called to a patient and found him in deep coma, which had been preceded for two days by headache, vertigo, apathy, and complete anorexia. The diagnosis at first sight seemed to rest between epilepsy and apoplexy. A hasty examination showed a rapid, regular, but thready pulse, wide pupils, increased patellar reflexes, and a tonic spasm of the entire body, especially of the arms. The rapid reaction on stimulation made it more and more likely that the case was one of intoxication. It was then found that the patient had swallowed about two and one-half drachms of pure extract of male fern for an alleged tapeworm without subsequent catharsis. The author dwells upon the importance of removing the drug with castor oil, etc., to prevent absorption and subsequent poisoning, as in this case.—*Münchener medicinische Wochenschrift,* 1901, vol. xlviii., S. 1096.

[On the contrary, castor oil has been used in so many of the fatal cases that some other cathartic should be recommended.—R. W. W.]

Lead-poisoning from Diachylon Pills.—DR. W. WRANGHAM reports a series of five cases of lead-poisoning occurring in women who had taken diachylon pills for the purpose of inducing abortion. In all the cases the nervous system was most markedly affected, although gastro-intestinal symptoms and abdominal pains were also present. Ocular symptoms were particularly noteworthy, four of the patients presenting optic neuritis and ocular paralysis. The onset of optic neuritis is to be regarded with apprehension, as it usually presages grave mental symptoms, convulsions, delirium, and probably death. The ocular palsies included ophthalmoplegias, paralysis of the sixth nerve on the right and on both sides. It would appear from these cases that the sixth nerve is less resistant to the action of lead than other of the cranial nerves. Inasmuch as the practice of using these pills as abortifacients is wide-spread in England, at least, the author recommends the notification of all cases of lead-poisoning in women.—*British Medical Journal,* 1901, No. 2115, p. 72.

Ocular Symptoms of Lead-poisoning.—The eyes may be affected in lead-poisoning in four different ways, according to F. Pincus: (1) There may be sudden blindness, with or without retained perception of light. The pupillary reaction, as a rule, remains positive; there is no lesion to be discovered with the ophthalmoscope, and sight returns to normal after a few days. (2) Gradually increasing amblyopia with free or constricted field of vision, or central scotoma, may occur, due to a retrobulbar optic neuritis. (3) Occasionally well-developed neuritis or papillitis, with unfavorable prognosis, is seen; and, lastly, (4) the complicating nephritis may give its symptoms. Perhaps the transitory amaurosis is most interesting of all these, since its pathology is so little understood, it being undecided whether dependent on a cortical process or upon a hydrops of the optic nerve tissues.—*Münchener medicinische Wochenschrift*, 1901, No. 33, S. 1316.

Chronic Brass-poisoning.—Dr. William Murray says that this type of industrial poisoning is probably on the increase, and inasmuch as it is a very illusory affection it is worth while to describe it in detail. The main symptoms are ushered in, as a rule, by an anæmia of the oligemic type, with malaise, headache, and extreme weakness and nervousness. As the disease progresses the complexion becomes sallow, the subcutaneous fat disappears, until extreme emaciation is the rule. There is loss of strength, muscular tremors, myalgic and neuralgic pains, anorexia, and gastralgia. The tongue is furred, moist, and tremulous, and the bowels irregular. There is a metallic taste in the mouth, and the breath has a metallic odor. Catarrh of the air-passages is common. Aphonia, dryness, a tickling cough, expectoration, or even hæmoptysis may be present. Nervousness, faintness, profuse sweats, and cold sensations are very troublesome features. There is a green line at the base of the gums. At times the perspiration assumes a greenish hue, and the hair even may have a peculiar tint. The disease has a marked resemblance to some types of tuberculosis; the characteristic lung signs are, however, absent. With reference to the treatment, the author advises phosphorus or phosphoric acid. The former may be given in doses as high as one-thirtieth of a grain.—*British Medical Journal*, 1901, No. 2120, p. 405.

OBSTETRICS.

UNDER THE CHARGE OF

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Traumatism Favoring the Occurrence of Ectopic Gestation.—Seeligmann (*Deutsch. medicinische Wochenschrift*, 1901, No. 26) reports five cases in which he has traced a clear relationship between traumatism and the occurrence of ectopic gestation. The form of traumatism consisted in a fall or sudden jar, the patient falling backward and striking upon the ischia. In most cases pregnancy was not suspected at the time of the accident, but must have been present. Supposing impregnation to have occurred in the tube, it would be possible for such an injury to prevent the normal passage of the ovum, and thus favor the occurrence of ectopic gestation. These cases came to operation, so that no doubt can exist regarding the condition actually present.

Bipolar Version.—In the *American Gynecological and Obstetrical Journal*, July, 1901, FRY publishes a paper upon this subject. His cases were 14 in number, 50 per cent. of them primiparæ. Bipolar version and slow extraction was employed in 9. In 1 the application of forceps to the after-coming head followed bipolar version. All of the mothers recovered, and 5 out of the 13 infants were born alive. Two infants, twins, were not viable; 1 was at the seventh month, and 4 were dead when the case came under observation. Three infants died during delivery. The operation was undertaken for a low attachment of the placenta. In some of the cases severe hemorrhage occurred; in others, no great amount of blood had been lost.

Fry urges in his paper that bipolar version, often known as Braxton Hicks', has been neglected in the treatment of placenta prævia. Much of the modern teaching favors rapid dilatation, podalic version, and rapid delivery. The argument which supports this treatment is based usually upon the supposed better chance for the child's life. The risks to the mother, however, are considerably greater. A large number of children are lost by this method.

The Induction of Labor for Contracted Pelves.—SCHOEDEL reports, from the clinic in Dresden, 41 cases of induced labor occurring in 15,627 cases of labor, a ratio of 1 in 381 (*Archiv für Gynäkologie*, 1901, Band lxiv., Heft 1). This is a low percentage, as many writers upon the subject in other clinics give a ratio of 1 to 131 or 1 to 176.

Among the cases there were 5 of symmetrically contracted pelves, 27 of flat rhachitic pelves, 8 of simple flat pelves, and 1 of obliquely contracted pelvis. The smallest true conjugate for which the operation was performed was 7½ cm. The largest true conjugate was 9½ cm.. The average period of gestation was thirty-five weeks and three and one-half days. The longest gestation was thirty-seven weeks and five days, and the shortest thirty-three weeks and two days. The average length of the children was 47.1 cm., and the average weight 2527 grammes. Especial attention was given to cases in which the induction of labor seemed necessary. During the last two months of pregnancy these patients were kept constantly under observation. They were often examined once or twice each week in the clinic or at their homes. The comparative size of the fœtal head and the pelvis was carefully estimated.

There were 35 vertex presentations among these cases, 4 transverse presentations, 1 breech presentation, and 1 oblique position of the head. Of the children in vertex presentation 14 were spontaneously delivered and survived ; 4 perished a few days after labor. Of those born spontaneously 71.4 per cent. were discharged in good condition. Of the children that perished, inspiration pneumonia was found in 1 case, subpleural and subpericardial hemorrhage, with collapse of the lung, in another, intracranial bleeding in the third from long-continued labor, and also in the fourth because of the premature escape of the amniotic liquid. The child born in breech presentation survived.

In 26 cases labor terminated by operation. Version was done twenty-five times and the forceps used once. Of children born by version and extraction 56 per cent. were discharged in good condition, the remainder dying within two or three days after birth. While it is true that the child has the best chance for life when presenting by the head, this does not obtain when labor is unduly prolonged. The effort was made in each case to secure birth with the head presenting. When this could not be done, version was made early in labor, just before the membranes ruptured or immediately afterward. The only case in which forceps were used when the head was presenting was one in which tympany of the uterus suddenly developed after the head entered the pelvis. Mother and child recovered in this case. In the case in which the child presented with the head obliquely across the pelvis the child perished two days after delivery, and an indentation of the cranium with intracranial hemorrhage was found upon autopsy.

The indications for version in vertex presentations were prolapse of the cord in 4 cases, irregularity of the fœtal heart in 1, and an unfavorable position of the head in 14. In 1 placenta prævia required version before dilatation was complete. Craniotomy was also done in this case. In all of the 41 cases 35 children were born living and 6 were stillborn. During the first ten days after labor 9 of the children born living died; 63.4 per cent. of the children were discharged from the hospital in good condition. Of the mothers, 39 of the 41 were discharged recovered; 1 perished in the clinic with acute anæmia, atony of the uterus, and weakness of the heart. In the second case the husband insisted upon taking the patient to her home against the advice of the physicians. Symptoms of thrombosis were present, and the patient died of embolism before reaching the railway station. The maternal mortality in the series was 2.4 per cent. Three patients had continued high fever, one from pneumonia, the second from thrombosis, and the third from gonorrhœa, as gonococci were found in the vaginal secretion before the induction of labor.

The method of inducing labor was the introduction of the bougie, followed by the use of an elastic bag. A bougie is inserted and allowed to remain for twenty-four hours, when, if pains do not occur, a second is inserted. During the next twenty-four hours the cervix usually dilates sufficiently to introduce one or two fingers. An elastic bag is then introduced, and from 250 to 500 cubic centimetres of fluid is inserted. The average duration of labor by this method was forty-one hours and one minute.

In the care of the children the use of the incubator was found of great advantage.

An Unusual Form of Perineal Laceration.—ZANGEMEISTER (*Centralblatt für Gynäkologie*, 1901, No. 31) describes two cases of unusual laceration of the perineum which occurred in primiparæ in spontaneous delivery. A transverse tear first occurred between the anus and the vagina, and then above this the mucous membrane of the vagina was separated from the perineum and from the tissues at the sides of the vulva. The laceration extended almost to the urethra upon one side. The transverse laceration above the bowel did not communicate with the vagina. Both cases were treated by suture, but union did not occur. Secondary suture on the ninth day was also unsuccessful. After recovery from labor operation was successfully performed.

The Treatment of Puerperal Septic Infection.—BUDIN (*L'Obstétrique*, July 15, 1901) reports his results in the treatment of puerperal septic infection. His material embraced 33 cases brought to the hospital from outside, and 59 cases having rise of temperature among patients confined in the hospital. Of the first series of 33 washing out the uterus, with digital exploration, was sufficient. In 13 cases he had recourse to a prophylactic curetting, and in 16 cases he made digital exploration and used the écouvillon. This instrument is a swab or brush which is passed thoroughly over the mucous membrane of the uterus to remove débris. Of the 33 cases 1 died and the remainder recovered.

Of the 59 who had fever contracted within the hospital, in 5 digital exploration and douching were sufficient. In 54 digital exploration and the use of the écouvillon were practised. None of these patients died, but all made speedy recoveries.

Lymphangitis of the Breast, and Galactophoritis.—MAYGRIER (*L'Obstétrique*, July 15, 1901) reports 2432 cases of labor, of which in 139 cases the breast was infected, making 5.71 per cent. of the cases. Lymphangitis was limited in 61 cases to one breast only; in 25 both were attacked, and in 2 first one breast and then the other. The disease appeared at any time from the third to the twenty-fifth day, usually between the third and ninth. Patients were taken with inflammation of the breast who did not nurse the child as well as those who attempted to nurse their infants. In lymphangitis the attack of inflammation came on suddenly, with chill and fever, which rapidly abated. In galactophoritis, or inflammation of the milk-ducts, the progress of the case was slower, the disease developed very gradually, and there was usually no chill. The disease was insidious in its development. Infection of the lymphatics rarely returned, while infection of the milk-ducts would occur frequently in the same patient. A superficial lymphangitis usually terminated by resolution. Abscess was rare in both cases with intelligent treatment. Diagnosis is made by palpation, by observing the discoloration of the breast, and by examining the milk. These cases arise in women who have fetid lochia, in overcrowded and foul wards, and who have wounds and fissures in the nipple. Of the two lymphangitis is less severe and much shorter.

The treatment consists of strict antiseptic precautions and strict asepsis in the care of the breasts. The nipples and breasts are covered with sterile gauze. Boric acid compresses are used before and after nursing. The child's mouth is cleansed with boric acid solution, and the hands of nurses and attendants are made scrupulously clean. Cracks in the nipple are treated by compresses wrung out of alcohol and water, 1:5, or by a saturated alcoholic solution of orthoform. When the patient is attacked by galactophoritis she is immediately isolated, and the child is removed from the breast. In lymphangitis the treatment consists of compresses of boric acid solution, and warm applications, which are usually successful. In galactophoritis aseptic compresses are used, the milk is gently removed from the breast by expression if possible, and abscesses are promptly opened and drained.

The Metabolism of the Newborn.—CRAMER (*Archiv für Kinderheilkunde*, 1901, Band xxxii., Heft 1 and 2) has made a series of careful experiments to determine the metabolism of the newborn child and the circumstances which influence it most profoundly. He finds that newborn children obtain from the mother but little water during the first days of life. Unless the child is given water the secretion of urine is lessened and gradually increases as the secretion of milk becomes established. From the tenth day on in children well developed and well nourished the daily quantity of urine approximates 70 per cent. of the fluid taken.

The formation of gas in the intestine in newborn children occurs at intervals of about two hours. Soon after birth, from feeble metabolism and reflexes and because little water is taken, much less gas is formed than later in life. After the first ten days of life the activity of metabolism increases and gas is formed more freely.

GYNECOLOGY.

UNDER THE CHARGE OF

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Cancerous Degeneration of Fibromyomata.—HEGAR (*Centralblatt für Gynäkologie*, 1901, No. 27) reports seven cases of combined carcinoma and fibromyoma of the uterus. The capsule of the fibroid seems to oppose a certain barrier to the advance of the cancer. As soon as the capsule has been destroyed the malignant disease spreads rapidly through the fibromuscular tissue. Only two cases have been recorded in which epithelial ingrowths developed in the centre of a fibroid, nor were they clearly demonstrated as evidence of actual malignant degeneration of the benign tumor. It has not been proved that the presence of fibroids favors the development of cancer. The expressions "myocarcinoma" and "cancerous degeneration" of a fibromyoma should be discarded.

Resection of the Uterus for Displacements.—MAUCLAIRE (*Annales de Gynécologie et d'Obstetrique*, vol. lv., No. 28) advises the following plan of treatment for persistent anterior or posterior displacements where there is no disease of the tubes or ovaries requiring their removal. A wedge-shaped piece is removed in the median line from the anterior and posterior walls of the uterus, the portion resected being about half a centimetre in depth and the width depending on the displacement to be corrected and extending from the fundus to the vaginal junction. The cut surfaces are brought together with interrupted sutures placed at right angles to the long axis. Very little hemorrhage occurs. It may be necessary to shorten the round ligaments or resect the sacral ligaments in order to assure a complete reduction of the displacement.

Preliminary dilatation and curettage, and, when needed, repair of the pelvic floor should be practised in all cases.

Leucoma or Leucoplakia of the Vulva.—BUTLIN (*The British Medical Journal*, July 13, 1901) reports four cases in which leucomatous areas, similar to those found on the buccal mucous membrane, occurred on the mucous membrane of the vulva. The patients were all past the climacteric—one, aged sixty-six years; another, seventy-three years. No symptoms were produced until ulceration had occurred in one or more of the plaques. Microscopic examination in three of the cases, of sections from the ulcerated areas, showed them to be true epitheliomata. The fourth case passed from observation before sections were made, but undoubtedly died from malignant disease.

Removal of the ulcerated areas, together with the leucomatous plaques, was the treatment in three cases.

Necrosis of Cervix Uteri Following Supravaginal Hysterectomy.—REGALL (*The British Gynecological Journal*, vol. xvi., No. 63) performed hysterectomy for multiple fibroids complicated by numerous and firm adhesions. The patient suffered greatly from shock, so that the operation was completed in haste, the cervix being divided some distance above the point of ligation of the uterine arteries. The patient did well until the fifth day when her temperature began to rise, and on the seventh day reached 102° F. There was a profuse, dark-colored, foul-smelling discharge from the vagina, and on the tenth day a slough was passed per vaginam. This consisted of a disk of cervical tissue. The patient recovered.

MacNaughton-Jones reported a similar experience following supravaginal hysterectomy for uncomplicated myoma. The patient did well until the fifth day, when her temperature rose, and some time later a large mass was passed per vaginam, which was found to be the stump of the cervix with six sutures attached. The patient made a good recovery.

Double Vagina and Uterus.—ROBB (*Cleveland Journal of Medicine*, vol. vi., No. 6) reports a case of this comparatively rare condition. The patient, aged twenty-three years, unmarried, complained of dysmenorrhœa, backache, and pain in the lower abdomen. The catamenia began when she was sixteen, had never been regular, occurring every five or six weeks, were scanty in amount, and lasted about two days. Examination under anæsthesia showed the following condition: On separating the labia an irregular band of tissue was seen extending from the posterior to the anterior wall of the vagina.

This septum was to the right of the median line, dividing the vagina into two unequal cavities, the opening to the left being about normal in size, that to the right large enough to admit the index finger. The cervix on the left side was far back in the vagina, and the posterior portion of the vagina was much contracted, barely admitting two fingers. A distinct cervical opening could be felt. The same condition existed in the right cavity. The septum between the two cavities was quite thick, measuring 1 cm. at the vaginal opening. Both cavities had a depth of 8 cm.

Sounds passed into the cervical openings showed that there were two uterine cavities having a depth of 7 cm. and separated by a thick ridge of tissue. The uterus was freely movable. The adnexa could not be clearly defined.

An exploratory abdominal section was made. The uterus was found to be small, but otherwise normal externally. The outlines of the fundus were regular. Both ovaries were freely movable and contained a number of Graafian follicle cysts. After closing the abdominal wound the vaginal septum was divided. The uterus was then drawn down and the uterine septum divided. The uterine cavity was curetted and packed with gauze. The endometrium was very scanty, and microscopically showed a condition of chronic interstitial endometritis.

Ovarian Organotherapy.—KRUSEN (*Johns Hopkins Hospital Bulletin*, vol. xii., No. 124) after the use of ovarian extract in three classes of cases—(1) those suffering from amenorrhœa, dysmenorrhœa, and other forms of pelvic disease; (2) those suffering from the vasomotor changes, the cardiac neuroses and depression following the removal of the uterine appendages; (3) those suffering from the disturbances of the natural menopause—reaches the following conclusions:

1. Administration of ovarian extract is practically harmless, even full doses having no untoward effects beyond slight nausea. 2. No beneficial results were obtained in amenorrhœa or dysmenorrhœa. 3. The best results were obtained in the second class of cases when in a few instances the congestion and nervous symptoms due to the artificial menopause were apparently ameliorated. 4. No appreciable effect was noticed from the use of the extract in the natural menopause. 5. No definite or exact reliance can be placed upon ovarian extract, as it often proves valueless where most positively indicated, and when it does seem to have effect increase in dosage has little influence in maintaining that effect or preventing the patient from becoming accustomed to its use. 6. It is extremely problematical, considering the neurotic type of patients demanding treatment, whether, where good effects were noted, the result was not due to mental suggestion rather than to any physiological action of the drug.

Phlebitis Complicating Supravaginal Amputation.—VERDELET (*Journ. de Méd. de Bordeaux*, 1901, No. 271) reports two cases of phlebitis developing two and four weeks after supravaginal amputation of the fibroid uterus, and infers that the relatively greater frequency of this complication following this operation as compared with total extirpation may be due to the presence of a mild septic infection which is favored by the absence of drainage.

[In our experience the occurrence of phlebitis after abdominal section is in no way dependent either upon the extent of the operation or upon the method adopted. Nor can it always be proved that it is of septic origin. —ED.]

Preclimacteric Hemorrhages.—THEILHABER (*Archiv für Gynäkologie*, Band lxii., Heft 3) takes issue with Czunpin regarding the cause of hemorrhages before the menopause, who believes that they are due to irritation of the endometrium secondary to disease of the adnexa, while the writer affirms muscular atony is the prime cause. The rapid growths of fibroids sometimes observed near the climacteric is doubtless due to the hyperæmia resulting from this condition of atonicity. This is favored by the increase of connective tissue and muscular atrophy observed in the uteri of women over forty.

Hyperplastic endometritis is a common result of this imperfect muscular contraction, hence the great tendency to recurrence after thorough curettement in this class of cases.

Radical Operation for Carcinoma Uteri.—MACKENRODT (*Centralblatt für Gynäkologie*, 1901, No. 27) emphasizes the fact that during the twenty years in which vaginal hysterectomy has been the accepted method of treating cancer of the uterus, only 10 per cent. of the patients thus treated have been cured. This poor result has been due to the fact that the operation has not been a radical one. Since early metastases occur in the vagina, broad ligaments, and glands, only a complete removal of these can insure against a recurrence.

The writer has hitherto employed igni-extirpation. Out of 39 patients 31 still survive, 18 of whom were perfectly well at the end of from three and a half to six and a quarter years. Only 11 cases were suitable for a radical operation. Of these 8 (72.8 per cent.) were cured, there being no deaths. Of the inoperable cases 7 died, 10 had a recurrence, and 10 patients were well after the lapse of over three years. These results, the writer claims, are much better than those obtained by any other method. In order to make the operation more radical he advises the abdominal route, with extensive removal of the gland, parametric tissues, and upper half of the vagina under strict precautions to avoid septic infection and inoculation of raw surfaces with cancer cells. His modified technique is as follows: A large crescentic abdominal incision is made, extending from one iliac spine to the symphysis, and upward to the opposite spine; the insertions of the recti muscles are divided, and the peritoneum (without incising it) is separated from the abdominal opening as high as the umbilicus. The abdominal muscles are then separated from their pelvic attachments, so that a large gaping wound is made. The peritoneum is now opened by a free transverse incision near its reflexion over to the anterior wall of the bladder, the uterus is drawn out, and the ovarian arteries ligated in the usual manner. The posterior edge of the peritoneum is now sutured behind the uterus from the right side of the pelvis across to the left, covering the sigmoid flexure. This allows the subsequent steps of the operation to be conducted extraperitoneally. The pelvic peritoneum is directed upward, carrying with it the ureters as high as the iliac vessels, where the glands are found and removed with the surrounding fat and connective tissue. The ureter must be carefully protected. Peritoneal openings are sutured. The bladder and rectum are next separated, and the entire vagina freed. Then the broad ligaments and paravaginal tissues are separated; the vagina is clamped and divided with the cautery below the clamps. In this case neither instruments nor raw surfaces come in contact with cancerous tissue during the operation.

The short flap of peritoneum attached to the bladder is sutured to the peritoneum posteriorly, so that the pelvis is completely shut off from the general cavity and can be drained per vaginam. The space between the bladder and abdominal wall is drained through the lower angle of the external wound. The writer insists on the fact that no single point in his technique must be omitted in order to prevent general infection. Extensive suppuration of the large cavity between the rectum and bladder is to be expected.

Six successful operations are reported.

DERMATOLOGY.

UNDER THE CHARGE OF

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Anomalous Squamous Dermatoses, Especially Psoriasis.—CASOLI (*British Journal of Dermatology*, March, 1901, p. 104) arranges the scaly diseases of the skin into three main groups. I., the hyperkeratoses, of which ichthyosis is an example; II., the keratolyses, such as pityriasis, and III., the parakeratoses, typified by psoriasis. The author takes the position that psoriasis is not always marked with the so-called typical eruption, and gives the following deviations constituting varieties: (1) Eczemaboid psoriasis, which is closely related to so-called seborrhœic eczema; (2) pityriasiform psoriasis, allied to pityriasis rubra; (3) "varicose" psoriasis, or psoriasis cheloidia; (4) lichenoid psoriasis; (5) psoriasis follicularis; (6) papillary fungoid psoriasis, and (7) rupioid psoriasis. In addition certain anomalies of distribution are noted, as (1) inverted psoriasis, affecting flexor surfaces; (2) circumscribed psoriasis, and (3) psoriasis of mucous membranes. Reference is also made to cases originating in traumatism, after vaccination, and due to nervous influences.

A Peculiar Case of Dermographism (Chronic, Factitious, Hemorrhagic Urticaria).—T. FABOG (*Archiv für Derm. and Syph.*, 1900, vol. liv.) describes a case differing from the usual form in that hemorrhage instantly appeared in the wheals produced. The urticaria quickly disappeared, but purplish bands remained for weeks, which underwent the usual changes of color met with in extravasated blood. The lesions were always traumatic, though the exciting cause was often insignificant. Even the palms and soles were the seat of lesions. The nervous system appeared to be healthy. The patient died of exhaustion.

Cutaneous Diseases Accompanying Diabetes.—HARTZELL (*Journal of the American Medical Association*, January 26, 1901) calls attention to a number of manifestations on the skin met with in diabetes, among them diminution of the sweat and sebaceous secretions, accompanied by generalized itching and pruritus of the genitalia, arms, and thighs. Various forms of erythema, and sometimes chronic urticaria, also occur, while eczema is one of the commonest complications, frequently located about the genitalia. Pruritus and eczema may prove to be the first symptoms of eczema, occurring in individuals who suffer either from thirst or polyuria. The furuncles, carbuncles, and gangrene met with do not differ from those due to other causes. The eruption of a peculiar form of xanthoma, consisting of firm, yellowish-red, rather flat papules disseminated over the arms, legs, and buttocks, is almost pathognomonic of the disease.

Veld Sore.—S. GUISE MOORES (*British Medical Journal*, May 4, 1901, p. 1078) states that this peculiar form of sore is prevalent in South Africa all the year round, and that officers and men in the British regiments have suffered alike. An abraded surface appears to be essential for its production, whether it be due to a sun blister, bite of an insect, or an abrasion. Of its specific bacterial origin there is no doubt, the micro-organisms being present in water, and washing secures its entrance. The fact of its presence on the hands, and next in frequency the face and feet, tends to this view. It is auto-inoculable. The ulcer usually begins as a blister, becoming rapidly pustular, the walls bursting and leaving a red, irritable-looking ulcer with depressed surface. It spreads marginally until arrested by treatment. The natives of South Africa are exempt, and dark-haired Europeans seldom contract the sore, but those with light or red hair seldom escape. Strong carbolic acid followed by corrosive sublimate lotion (1 : 3000) is an effective treatment.

Vaccinal Lupus.—E. G. LITTLE (*British Journal of Dermatology*, March, 1901) gives an interesting article on this subject supported by a case of his own and cases of other observers. The authentic cases on record, however, are not numerous. The author believes with Payne that cases will be more frequently observed as attention is directed to the subject.

The Bacillus of Leprosy.—BARRANIKOW (*British Journal of Dermatology*, March, 1901, p. 108) from personal studies expresses his opinion that the life-history of the bacterium lepræ is an extremely complicated affair. Animals are not receptive to the microbe in all its forms of development. In one phase it loses its specific stain (Ziehl-Neelsen method), not only when passed through 1 per cent. of sulphuric acid solution, but when water only is used, although its clinical characteristics remain the same.

Formalin in the Treatment of Lupus.—W. SCATCHARD (*British Medical Journal*, May 4, 1901, p. 1078) reports a case of lupus of the nose of five years' standing in which the application of equal parts of formalin (formic aldehyde, 40 per cent.) and glycerin, preceded by orthoform powder to lessen the pain, acted very happily. There were during the following year at or near the original lesion slight recurrences, all of which disappeared under the same treatment. If orthoform was applied about an hour before the painting, there was no pain. The resulting scar caused very little disfigurement.

Alopecia Areata.—E. J. EMERICK (*Columbus Medical Journal*, February, 1901) cites several cases under his observation that were benefited or cured by applications of chrysarobin ointment, 10 to 15 per cent. strength, used daily for a week or ten days, followed by pure carbolic acid applied lightly with a swab. The ointment referred to sets up considerable inflammation, and must be used cautiously. When this inflammation has subsided areas here and there the size of a silver dollar are touched from time to time with the acid. The results in the cases given were highly satisfactory.

Koplik's Spots: Their Value in the Diagnosis of Measles, Particularly in Private Practice.—J. ZAHORSKY (*Maryland Medical Journal*, April, 1901) still adheres to his statement, made some time ago, that Koplik's sign is found only in connection with measles, and when present is a pathognomonic sign of that disease. These lesions (as is now well known) consist of minute bluish-white spots, very slightly elevated, and situated in an inflammatory base. At the beginning of the buccal exanthem irregular areas of congestion are visible, which soon become more or less confluent, forming irregular patches. After two or three days of prodromal fever the exanthem is well defined, constituting the efflorescence of measles on the mucous membrane analogous to that on the skin. The exanthem on the mucous membrane is not diagnostic until the bluish-white spots appear. They are composed principally of epithelial cells, being a furfuraceous desquamation of the mucous membrane, entirely analogous to that of the skin. They have not met with it in other eruptive diseases. Daylight is necessary to obtain a good view of them. They are not always present, but when absent all the symptoms and signs, with the history of the case, must be considered before measles can be excluded. It should be remembered that the earliest sign of measles is the typical efflorescence on the mucous membrane. If the post-cervical glands are enlarged and the prodromal fever has been very short, and there is no trace of Koplik's spots, the disease may be diagnosed as rubella; but if the prodromal fever lasts three or four days and the glands are only slightly enlarged, the disease may be assumed to be measles, even if the spots are absent.

The Blood in Epidermolysis Bullosa Hæreditaria.—T. R. BROWN (*Maryland Medical Journal*, April, 1901) found in the blood counts 11,000 leucocytes per cm., of which 42 per cent. were polymorphonuclear neutrophiles, 40.6 per cent. small mononuclears, 7.7 per cent. large mononuclears and transitional forms, and 9.7 per cent. eosinophiles. There was thus a moderate eosinophilia, the eosinophiles being all of the polymorphonuclear variety.

This agrees with the results given by Colombini. The conditions of the blood and the contents of the vesicles harmonize with what might be expected from the pemphigoid character of this disease, namely, that there is both a general and a local eosinophilia, although of moderate degree. Neusser, Gallasch, and Lukasiewicz first called attention to the great number of eosinophiles in the blebs of pemphigus, but these cells are met with in various bullous as well as in certain vesicular lesions, especially in recent lesions.

Syphilitic Lesions of the Wheal Type.—H. G. KLOTZ (*Journal of Cutaneous and Genito-urinary Diseases*, February, 1901), after calling attention to the well-known observation that syphilis may imitate almost any of the non-syphilitic diseases of the skin, cites some cases of his own in which urticaria was simulated, the forms of eruption being neither macular nor papular, but pemphigoid or wheal-like, without subjective symptoms. In one case the lesions seemed to be of the nature of a relapse upon the site of a previous ordinary early syphilitic macule. The author regards these lesions not only as rare, but different from the syphilitic lesions usually described in the books.

Rochard's Ointment in the Treatment of Psoriasis—BLASCHKO (*Dermatologische Zeitschrift*, Band viii., Heft 3), at a meeting of the Berlin Dermatological Society, directed attention to the excellent results obtained from the use of an old remedy, Rochard's ointment, in psoriasis. This ointment consists essentially of a mixture of the green and red iodides of mercury obtained by mixing iodine with calomel; it is prepared according to the following formula: Iodine, 6 parts; calomel, 1.8 parts; vaseline or suet, to 100 parts. Blaschko usually adds to the mixture some ether or alcohol. According as alcohol is added or not and the mixture is heated slowly or rapidly the color of the ointment varies. While in a certain number of individuals the ointment may cause irritation, in a large number of cases of psoriasis the eruption may be made to disappear without any, or with very slight, irritation of the skin. In a certain number of cases the author has found the remedy preferable to chrysarobin.

Atypical Corneous Formation.—HERXHEIMER and HILDEBRAND (*Archiv für Dermatologie und Syphilis*, Band lvi., Heft 1) describe certain peculiar hitherto undescribed structures found by them in the cells of pavement-celled carcinoma of the skin. They were usually round, sometimes oval, or less frequently crescentic in shape, the crescent-shaped bodies covering the half of the nucleus of the cell like a cap. They were situated in the cell protoplasm at a distance of 1 to 2 microns from the nucleus; occasionally they were near the periphery, without, however, being in contact with the cell-mantle. The size varied considerably, the round ones being from 3 to 5 microns in diameter, while the oval ones were larger, measuring from 6 to 7 microns in diameter. As a rule, but one body was found in a cell, but occasionally two were seen, and not more than every third or fourth section examined contained them. They were found exclusively in cells in the neighborhood of epithelial "pearls." Intense cornification seemed to be a condition indispensably necessary to their production. The tinctorial properties of these structures showed them to be composed of corneous material similar to the corneous cells of the epidermis.

Bullous Urticaria.—MALCOLM MORRIS (*British Journal of Dermatology*, May, 1901), at a recent meeting of the Dermatological Society of London, presented a case of urticaria occurring in a female infant, aged thirteen months, in which, in addition to urticarial wheals, large bullæ were present upon the back. When the child first came under observation the bullæ were distributed over the trunk, limbs, and scalp. The infant was in other respects healthy. LITTLE (*Ibid.*, July, 1901) at a subsequent meeting exhibited an infant, eleven days old, in whom there was an eruption of bullæ varying in size from a quarter to one-half inch in diameter upon a generally erythematous skin. There were also isolated bullæ in both axillæ, in the suprapubic region, on the backs of the thighs, the cheeks, forehead, and genitalia. At the same time there were small urticarial papules on the arms, palms, soles, shoulders, and cheeks. Apart from the cutaneous affection the child was healthy.

DISEASES OF THE LARYNX AND CONTIGUOUS STRUCTURES.

UNDER THE CHARGE OF

J. SOLIS-COHEN, M.D.,

OF PHILADELPHIA.

Laryngeal Whistling.—DR. G. HUDSON MAKUEN reported to the Section on Laryngology and Otology (*Journal of the American Medical Association*, 1900) two cases of laryngeal whistling, one of which he was able to study with the laryngoscope, and found that the lips of the superior aperture of the larynx were pursed in the same way as the lips of the mouth are pursed in ordinary whistling.

Two Cases of Ligation of the External Carotid for Severe Hemorrhage, One after Tonsillotomy, the Other after a Slight Intranasal Operation.—DR. W. W. KEEN reports (*Annals of Surgery*, July, 1901) two cases of secondary hemorrhage resisting the usual measures of repression. Both cases made good recovery. The nasal operation consisted in curetting hypertrophies of the posterior portion of the nasal septum.

Historic Records.—DR. JONATHAN WRIGHT, of Brooklyn, N. Y., has begun a series of papers (*The Laryngoscope*, July and August, 1901) on the nose and throat in the history of medicine, thus far having touched upon the medicine of the Egyptians, Chaldeans, the Parsees, the Jews, the Hindoos, the Grecians, and the Romans.

Suppurative Parotitis.—DR. FRANCIS R. PACKARD reports (*Journal of the American Medical Association*, August 17, 1901) two cases of suppuration of the parotid gland, with pus in the external auditory canal, a condition which he believes must be frequently overlooked by the general practitioner and by others who have not made a special study of the subject, the pus being regarded as coming from the middle ear instead of reaching the parts as it does do by infiltration through the incisuræ Santorini.

Diseases of the Maxillary Antrum.—DR. W. E. CASSELBERRY, of Chicago, reports two cases of serous disease of the maxillary antrum (*The Laryngoscope*, July, 1901) and discusses the subject in its general aspects, giving a bibliography of its literature. He concludes that the diagnosis of accumulation of serum in the antrum without its distention or deformity must be based upon aspiration, the transillumination test being indecisive. The discrimination of a free collection of serum from a cyst may be quite impracticable, even when the sinus has been widely opened, and sometimes it has been impossible to determine the point even on autopsy. The treatment may consist in removing any polypi, resecting enlarged middle turbinated bodies, removing any other obstruction of the opening of the orifice of the sinus, with due perforation for drainage. Should this fail an opening in the anterior wall of the sinus should be made sufficiently large for palpation, and then curetting would seem to promise a cure and perhaps forestall what would ultimately become an empyema.

Osteoma of the Frontal Sinus.—DR. W. D. HAMILTON, of Columbus, Ohio (*Journal of the American Medical Association*, January 26, 1901) reports two cases in males, aged respectively thirty-six and twenty-seven years. In the latter case the neoplasm was of softer consistency, and was complicated with polypoid growths and a rather extensive suppuration. Recovery followed operation in both instances.

Syphilis of the Lymphoid Tissue in the Base of the Tongue.—DR. G. HUDSON MAKUEN, of Philadelphia, reports (*Journal of the American Medical Association*, August 17, 1901) a case in which the tertiary manifestations were confined entirely to this tissue, and Dr. Casselberry, of Chicago, in opening a discussion upon a paper which was read at the last meeting of the American Medical Association, mentioned a similar case in which, from a mistaken microscopical examination, a large mass had been removed after pharyngotomy, under the supposition that it was a case of carcinoma. Dr. Stout, of Philadelphia, referred to a case in a trained nurse who had caught the original infection by sucking milk from an abscessed breast.

Morbid Growths of the Palate.—DR. WILLIAM F. DUDLEY, of Brooklyn, N. Y., reports (*The Laryngoscope*, August, 1901) an unusual case of papillomatous growths of the soft palate in a man, aged seventy-one years. They were successfully removed with the wire snare.

Coincident Follicular Tonsillitis and Diphtheria.—DR. WILLIAM P. MUNN, of Denver, reports (*American Medicine*, September 7, 1901) a case in which diphtheria affected one tonsil, and follicular tonsillitis the other. It does not appear, however, that the diagnosis in the latter instance had been verified by microscopic inspection of the exudate.

A Snare Guard for Ecrasement of the Tonsils.—DR. OTTO T. FREER, of Chicago (*Journal of the American Medical Association*, August 17, 1901) presents a snare guard for Ingals' operation after ecrasement of the tonsils, which facilitates the effective use of the loop. The wire is enclosed in a ring which is passed over the mass as it is held in the grasp of the forceps.

Typhoidal Laryngitis.—DR. D. J. GIBB WISHART, of Toronto, Canada, reports (*Philadelphia Medical Journal*, September 7, 1901) a case of typhoidal ulceration and abductor paresis of the larynx which required tracheotomy. The patient recovered.

Some investigation into the literature of the subject follows a report of the case.

Thuja in Papilloma of Larynx.—Every now and then some drug is lauded as topically effective in growths of the larynx. Now it is alcohol, again magnesia sulphate, and what not. DR. JAMES MOREAU BROWN reports successful results from tincture of thuja-arbor vitæ applied with a cotton swab (*Journal of the American Medical Association*, August 3, 1901.)

Thuja has been recommended internally for the same purpose, as have likewise magnesium sulphate and other drugs.

The fact is that spontaneous retrogression sometimes takes place in papillomas of the mucous membranes, in some instances in sequence to any abrasion or injury which may disturb the equilibrium of the circulation within them.

Fracture of the Larynx.—DR. ARTHUR W. WATSON reports (*The Laryngoscope*, July, 1901) a case of stenosis of the larynx following fracture, with recovery after operation. A boy, aged sixteen years, while riding his bicycle ran into the tail-board of a wagon, striking the thyroid cartilage. Six weeks later dyspnœa ensued, which was found to be apparently due to adhesion between the ventricular bands. These were separated, yielding but slight relief, and an O'Dwyer intubation-tube was then introduced. Five months after the injury a preliminary tracheotomy was performed, and three weeks later laryngo-fissure. The stenosis was found to be due to a great deal of redundant tissue, which was cut away from the wall of the larynx and shelled out without injury to the soft parts within. The patient was dismissed, still wearing the tracheal canula, and this was subsequently removed a couple of weeks later. The voice became clear and strong, and the breathing perfectly free.

Foreign Bodies in the Larynx.—In the course of an article detailing a number of curious cases of foreign body in the larynx, DR. J. GAREL, of Lyon (*Annales des Maladies de l'Oreille du Larynx, etc.*, August, 1901), recommends and depicts an electro-magnetic extractor for extracting metallic bodies which might be likely to slip from the grasp of the forceps. This instrument is modelled upon the similar extractor of Wetherla, originally designed for the extraction of O'Dwyer tubes, and will sustain a weight of one kilogramme, so that considerable force can be exercised with it.

Œsophagometry.—DR. C. D. SPIVAK, of Denver, recommends (*New York Medical Journal*, August 31, 1901) an intragastric whistle as a new device in measuring the length of the œsophagus in the living subject. A whistle is attached to the distal extremity of a stomach-tube. The whistle blows as it passes the cardiac orifice into the stomach. Its distance from the teeth can then be measured.

PATHOLOGY AND BACTERIOLOGY.

UNDER THE CHARGE OF

F. B. MALLORY, M.D.,

ASSISTANT PROFESSOR OF PATHOLOGICAL ANATOMY, HARVARD UNIVERSITY.

Echinococcus Multilocularis.—MELNIKOW-RASWEDENKOW. The fourth supplement of Ziegler's *Beiträge*, 1901 seems to mark a change of policy in the conduct of that series. Unlike the monographs of Pianese on carcinoma, of Hückel on vaccine bodies, and of Sata on mixed infections in phthisis, the present three-hundred-page volume is in the main casuistic. By the co-operation of several (chiefly German and Russian) laboratories, it has been possible to obtain a series of 101 cases in man of the alveolar (or multilocular) type of echinococcus disease. Thorough routine histological study, some comparative work, and a moderate amount of statistics render possible a considerable modification of older views of the disease. Such casuistic work justifies itself, and the supplement series does not suffer.

The parasite which causes the multilocular type of echinococcus disease is not *tænia echinococcus*. In the first place no intermediate host is required. Granted an embryo which gains entrance from the gastro-enteric tract *via* the blood stream to some portal venule beneath the liver capsule, a multilocular chitinous structure then forms wholly resembling the mature proglottis of a tapeworm. From the finely granular protoplasm which lines the chitinous walls, both within and without, there are formed not alone scolices (as from the inner wall of an ordinary or unilocular hydatid), but also young parasite forms (without capsule) and ovoid embryos (with capsule). Such embryos, discharged from the outer surface of the cyst, may fall victims to phagocytosis in tissue spaces, or, if they obtain access to the lumina of bloodvessels or bronchioles, they may there develop fresh chitinous cysts. The new crop of cysts loses in virulence and remains sterile. One is thus reminded of the trematode fashion of developing rather than of the way described for cestodes in general.

Meantime the ready release of embryos from the outer coating of the cyst renders metastasis easy (*e. g.*, to lymph nodes, lung, brain), and produces in the neighborhood of cysts a type of reaction not far removed from the infectious type. Toxins effect an increased tendency to proliferation, may, indeed, cause more or less local necrosis, and form a kind of granuloma, characterized by the presence of lymphoid cells, epithelioid cells, and giant-cells, with caseous degeneration

More cases occur in Russia than have been supposed, and more than even the present collection (seventy) might suggest. The parasite is of wide distribution upon the Continent, and two forms of parasite have been met with in the same regions.

The details of the method of infection remain unknown, and experimental biology has been perforce deferred. As far as examined, the reactions of man and the lower animals to the parasite present no essential differences.

Histologically, the work is nigh to settling a moot-point. Such differences as the two types are now seen to present were at first thought capable of explanation on the basis of individual tissue differences. It was thus that Virchow had explained the matter. But the discovery of the two kinds in one liver, a great hydatid in the right lobe and an alveolar group, unrelated with the hydatid, in the Spigelian lobe, together with an adequate definition of the two types of growth (such as afforded by the present work), makes it unnecessary to suppose, here at least, such mysterious differences of reaction.

As to technique there is little to say. Melnikow-Raswedenkow prefers formaldehyde fixation, celloidin embedding, and staining with Weigert's elastic tissue stain, followed by either eosin or Van Gieson's mixture and alum-hæmatoxylin. There are some pretty plates, showing, among other things, phagocytosis and the penetration of the elastic membrane by young forms of the parasite in the act of invading a vessel.—E. E. S.

Observation on the Occurrence of Plasma Cells and Mast Cells.—HIRSCHMANN (Virchow's *Archiv*, 1901, clxiv., p. 541) has made a histological study of twenty-five larynges which were the seat either of acute or of chronic inflammation. Cases of tuberculous or syphilitic laryngitis were excluded.

Plasma cells were not found in the normal or in the inflamed larynx. Joannovicz, Unna, and v. Marshalko agree that plasma cells are formed when a strong infectious irritant acts for quite a long time, producing a loss of substance and a destruction of cells whereby chromatin is set free. Unna states that plasma cells are rarely formed by the action of weak irritants, for example, in infectious catarrhs, and then only in small numbers. A loss of substance is ordinarily the sign of a strong, progressive, and long-continued disturbance of nutrition.

Laryngitis is usually due to an irritant which is too weak to produce an extensive destruction of cells. There is generally a marked emigration of leucocytes and proliferation of cells. Without undergoing necrosis these cells are cast off and form part of the secretion. Hirschmann found mast cells in every case. This is in accord with the statement of various writers that mast cells are found especially in those organs which are the seat of a mild but long-continued inflammation. For the demonstration of mast cells either thionin or aqueous methylene blue gives as good results as polychrome methylene blue.

The mast cells were never very abundant in the cases of laryngitis which resulted from chronic passive congestion. In those of purely inflammatory origin, however, the mast cells were numerous. Although they were scattered diffusely through the mucosa and submucosa they were always present in largest numbers in the neighborhood of the vessels and glands, which were always surrounded by collections of small cells. Normally the tissues of the larynx are infiltrated with small cells, but in pathological conditions this infiltration is increased.

The writer believes that the different forms of mast cells which have been described really represent different stages in the development of the same cell. He makes the following divisions: First stage. Cell elongated; blue the predominating color of the protoplasm; nucleus darker blue and staining intensely; no indication of karyokinesis. One pole of the cell body takes a slightly reddish tinge due to the presence of single red granules. Second stage. The size of the cell increases, and the red tinge gradually becomes more pronounced until at length the entire cell body is composed of red granules. The contour of the nucleus may become indistinct, but more commonly the nucleus remains unchanged. Later some of the granules break through the cell boundaries, and are seen lying free at a greater or less distance from the cell. Last stage. The nucleus has disappeared. An irregular clump of red granules and single scattered granules near it are all that remain of the cell. These three stages are not sharply separated from one another.

Andry and Newberger regard the mast cells as related to the leucocytes, but the direct proof is wanting. Hirschmann claims he has furnished this by the discovery of a mast cell in the act of migrating through the wall of a capillary. Large mononuclear leucocytes, he says, wander into an inflammatory area, and are there converted into mast cells by taking up the products of inflammation. It is these products of inflammation which give the cell its characteristic color. These substances, the nature of which is unknown, are ingested in great amount and lead at length to the destruction of the cell.—J. H. P.

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THE
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DECEMBER, 1901.

PENETRATING GUNSHOT WOUNDS OF THE ABDOMEN.[1]

By Robert G. Le Conte, M.D.,
of Philadelphia.

Gentlemen: I have the opportunity of showing you this morning a case which illustrates a very dangerous and fatal class of injuries, and one which is not often available for clinical purposes, namely, a penetrating gunshot wound of the abdomen. Such wounds are among the most serious conditions that a surgeon is called upon to treat. Many such cases are of necessity fatal from their inception, owing to the irreparable damage inflicted by the bullet, and no amount of surgical skill will overcome the injuries received. In other cases, however, we have a fair opportunity for a successful issue, and in these instances failure or success will largely depend upon the surgical methods pursued. I therefore propose to give you a description of this man's injuries, the treatment we have adopted, and then discuss with you some of the important surgical points in this class of cases.

The patient, a well-developed negro laborer, aged twenty-seven years, was admitted to the Pennsylvania Hospital, September 7, 1901, at noon. Fifteen minutes before admission he was twice shot with a 32-calibre revolver. The first bullet caused a superficial wound of the left thigh, but the second struck him in the back while he was running away from his antagonist. The estimated distance at which this shot took effect was twenty feet. I saw the patient two and a half hours after the injury was received. He was then in a highly excited condition, in part, perhaps, due to the fact that his ante-mortem statement had just been taken by a magistrate, and the necessary legal procedures had terrified him. He complained of intense, cramp-like pains in the abdomen, which made him cry out every few minutes. He was moderately shocked, with a rapid pulse, and labored respiration which was almost entirely costal. The wound of entrance was three inches to the right of the fifth lumbar spine and on a level with the crest of the ilium, and a probe refused to pass beyond the latissimus dorsi aponeurosis. There was no wound of exit. The abdomen was universally tender, distended, and resistant, tympanitic in front and dull in the flanks. Liver dulness in front reached to the costal border. The man was etherized, placed on his face, and the skin of the back carefully disinfected. As the probe still refused to follow the track of the bullet, the skin wound was enlarged sufficiently to see where the missile had separated the fibres of the aponeurosis. These fibres were divided, and a finger was carried along the track of the bullet to the crest of the ilium, where two or three splinters of bone were encountered. The bullet had then passed beyond the reach of the finger. Having assured ourselves that the missile had penetrated the peritoneal cavity from behind, a rubber drainage-tube was inserted in this track and the incision closed. The patient was then turned on his back, the skin of the abdomen carefully disinfected, and a six-inch incision made in the median line, the centre of which was the umbilicus. On opening the abdomen fluid blood immediately gushed out; the quantity was estimated at six pints. The whole of the small intestine was hastily drawn out of the abdominal cavity to the left of the incision, and surrounded with hot, wet gauze. In doing this a perforation of the small gut was seen. Its position was noted and the place covered with gauze, to prevent further extravasation of fecal material. The abdominal cavity was then cleared of blood by scooping it out with the hand and with gauze sponges, and it was seen that the bullet had perforated the upper portion of the mesentery, severing one of its large vessels. As it emerged from the mesentery it had torn an opening one inch long in the transverse colon. The hemorrhage was readily controlled by suture, the wound of the colon repaired, and the perforation of the small gut closed with silk. No further damage was found. Twenty pints of hot salt solution were used in washing out the abdominal cavity and the surface of the intestines, a glass drainage-tube was inserted, and the wound hastily closed with through-and-through silkworm-gut sutures. During the operation the patient's pulse had become very rapid and feeble, and an assistant opened the median cephalic vein and introduced five pints of hot normal salt solution. As the bullet had almost certainly lodged in the anterior abdominal wall, and was out of harm's way, no search was made for it, the patient's condition being so precarious as not to warrant any further interference.

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[1] Clinical lecture delivered at the Pennsylvania Hospital, October 12, 1901.

Immediately after operation the patient's temperature was 98.4° F., pulse 160, and respiration 60. Eight hours later the temperature had risen to 101° F., while the pulse and respiration had dropped to 124 and 44 respectively. He vomited twice while coming out from the effects of ether. During the first twenty-four hours he received medication by hypodermic only, and nothing was administered by the mouth.

The treatment consisted of one-thirtieth of a grain of strychnine every second hour, and as the pulse increased in volume and decreased in frequency, this was gradually reduced in amount. At the end of twenty-four hours one-sixth of a grain of calomel, with a mouthful of water, was given hourly for six doses. This was followed by an enema, which proved very effectual. As soon as the bowels were opened he was placed on peptonized milk, and the diet gradually increased from day to day. In the meantime the drainage-tube had been very carefully kept dry by having the accumulated fluid sucked up with a syringe. At first this had to be done every few minutes, owing to the large amount of salt solution which was left in the abdominal cavity, but at the end of six or eight hours the amount of fluid had so decreased that the drainage-tube was cleaned only once every hour or hour and a half. At the end of forty-eight hours the tube was entirely dry, and it was removed. At the time he received his injury the patient was suffering from a mild bronchitis, and during the convalescence he had a severe cough, with free expectoration. This was partly controlled by heroin, but the paroxysms of coughing everted the edges of the wound in three places, although none of the stitches gave way. The sutures were removed on the eleventh day, at which time also the rubber drainage-tube in the back was taken out, and the patient was out of bed on the twenty-second day. Owing to the fact that the X-ray apparatus in the hospital is not at present in a working condition, we have not been able to take a radiograph for the localization of the bullet in the anterior abdominal wall, but as soon as we can have a picture for a guide we will remove the bullet.

In discussing the subject of penetrating gunshot wounds of the abdomen with you, it is necessary that we consider in detail a number of important points.

1. *General Considerations.* The patient's temperature, pulse, and respiration should be taken as soon as possible, as it will give a fair idea of his general condition. While this is being done it is well to pass a catheter and withdraw the urine, for if it be tinged with blood we will know that some portion of the genito-urinary tract has been injured—either the kidney, ureter, or bladder. Next, when possible, we will get a history from the man of the position in which he was at the time he was shot, and from this estimate the probable course the bullet has taken in traversing the abdomen. In doing this you will naturally picture to yourself the organs that are likely to be wounded. Of course, this will be more or less of an assumption on your part, for bullets are so readily deflected that the direction of the wound of entrance does not always give us a clue to the further passage of the bullet through the body.

2. The question will then come up, Shall we or shall we not operate? Up to a few years ago a gunshot wound which opened any part of the alimentary tract was considered fatal unless operation was undertaken, and even then almost all cases died. At that time all gunshot wounds were alike, in that they were dirty, usually infected, lacerated wounds made by a comparatively large soft lead bullet of slow velocity. The bullet, in addition, was usually covered with grease. To-day we have a gunshot wound of very different character, made by a clean, small, highly polished steel bullet of high velocity. When such a missile has attained its true flight, it leaves a clean, sharp-cut wound, separating

the tissues as a wedge rather than tearing its way through. Penetrating abdominal wounds made by a lead bullet I believe are as fatal to-day as ever they were, whenever expectant treatment is pursued; but military statistics of field operations show that the wounds inflicted by the modern weapon have proved much less fatal under expectant treatment than when operation has been undertaken. We can scarcely wonder at this when we remember the circumstances under which operations are performed after battle in field hospitals, where the medical department has an immense work to do with scanty supplies and few assistants; but if such wounds presented themselves in a city hospital, with all the modern conveniences for aseptic surgery, would any of us hesitate between expectant and operative treatment? I should say no. Wherever we can with safety open an abdomen, I believe that every penetrating gunshot wound demands operation, no matter what the character of the bullet may be which has inflicted it; but where our surroundings are such that we cannot do a clean operation, expectant treatment will yield better results, especially if the wound is made by a modern bullet.

3. *Shock.* When shock is profound, should we wait for reaction to take place? Shock in such cases is almost invariably associated with hemorrhage, and its severity is almost directly proportional to the amount of blood lost. Occasionally, however, it is profound where hemorrhage has been slight. Here we will frequently find that the patient is of a highly nervous temperament, the type of individual who would be nauseated or faint at the sight of blood. Occasionally, also, profound shock may be due to very extensive injury to the hollow viscera, or, perhaps, contusion of some larger nerve trunks. Under such circumstances, what advantage can we expect to derive by delaying operation? To my mind, none. While an anæsthetic in the presence of profound shock is, of course, dangerous, this increased danger in no way counterbalances the benefits derived from its use. It will permit us to get at and control the cause of shock, by preventing further hemorrhage or greater soiling of the peritoneum; it enables us to repair the injuries inflicted and to reduce the dangers of septic infection to a minimum, and at the same time it permits the use of the two most valuable remedies we have for combating shock, namely, intravenous injection and douching the abdominal cavity with hot salt solution. I would therefore urge, that if operation is to be undertaken, it should be done immediately, as every half-hour of delay proportionally decreases our chance of success.

4. *Examination of the Wound of Entrance or Exit to Prove Penetration.* When the wound of entrance or exit does not give a positive sign of penetration, as the protrusion of some part of omentum or escape of fecal material, it must be carefully enlarged until the peritoneum is

reached, when sight or touch will tell of penetration. We should never take for granted that the abdominal cavity has been invaded from the apparent course the bullet has taken, nor from the local signs that may be present, such as tenderness, distention, muscular rigidity, shock, etc. All these signs may be present without an opening into the peritoneum. Four or five years ago I saw a very stout woman who was shot with a revolver. The wound of entrance was on a level with the left anterior superior spine of the ilium, and about two and a half inches to its inner side. The apparent course taken by the bullet was directly inward, and there was no wound of exit. The patient was considerably shocked, slightly tympanitic and distended, with rigidity of the left rectus, and marked local tenderness. I was confident the abdominal cavity had been opened, but proceeded to assure myself of this by exploring the wound. It was then proved that the bullet had ranged downward, and had penetrated to but not opened the peritoneum, passed under Poupart's ligament, and lodged in the muscle of the thigh. The woman was very stout with a pendulous abdomen, and as she reclined on her back the wound of entrance was on a level with the anterior superior spine of the ilium; but in a standing position, the position in which she was shot, the wound undoubtedly assumed a relatively lower position. You will therefore see that the external signs of penetration are not always to be relied upon, and that assured proof, either by sight or touch, is indispensable.

5. *Cleansing the Skin of the Patient.* I wish to call your attention to the importance of thoroughly disinfecting the skin of the patient previous to opening the abdominal cavity. As a rule, this cannot be well done until the patient is under an anæsthetic, owing to abdominal pain and tenderness, and at this time we are apt to do it hastily and ineffectually, when the patient's condition is precarious, in our desire to shorten the time on the operating-table. Time spent in cleansing a large area of skin around our proposed incision is well expended, and if our patient's condition is so grave that we dare not spare this time, operation should not be undertaken. Experience is the great teacher, and when one can learn from the mistakes of others it is more profitable than learning from one's own errors. I am therefore going to make a confession, which I trust will be instructive. Several years ago, before the days of normal salt solution and intravenous injection, when speedy operations seemed the most successful, I had a case of gunshot wound of the liver. The wound of entrance was in the back, the bullet having passed through the pleura, diaphragm, and whole thickness of the liver, and lodged under a rib in front. The man was profoundly shocked from loss of blood. I enlarged the opening in the back and packed the liver wound as thoroughly as possible from this position, and then, turning the patient over, made a curved incision along the border of the ribs, and completed the packing of the liver from the front. The patient's con-

dition was so serious that I did not spend over three or four minutes in cleansing the skin of the abdomen. He was dying from hemorrhage, and the indication seemed to be to stop the bleeding as soon as possible. After operation he reacted well, but died on the fifth day from septic peritonitis. A post-mortem examination revealed the wounded liver in excellent condition; no further hemorrhage had taken place, and the bullet track was filled with organizing sterile clot. Infection had started from the skin of the abdominal incision, and was traced, layer by layer, through the abdominal wall to the peritoneum, where it had become diffuse. In trying to save the man from a death by hemorrhage, I had unfortunately condemned him to one from peritonitis. Had ten or twelve minutes been spent in disinfecting the surrounding surface of the abdomen, infection would not have taken place, and the man would have undoubtedly recovered. Let us look at the question in another way. I am in the habit of spending fifteen minutes or more in preparing my hands before opening the abdominal cavity. Why should not the same careful preparation be given to the abdomen of the patient, when it is most probable that some portion of the peritoneal surface will come in contact with it before the operation is concluded?

6. *The Incision.* Penetration having been ascertained, where shall we make the incision for exploring the abdominal contents? This should depend upon two factors—the position of entry and the course the bullet has taken. If the missile has penetrated outside of the semilunar lines, and at a right angle to the anterior abdominal plane, I would open the abdomen in the semilunar line, rather than enlarge the bullet wound sufficiently to make a careful search of the abdominal organs. If it has entered in the same plane, but inside the semilunar line, I prefer a median incision, unless it is in the region of the liver, when a curved incision below the border of the ribs gives the best exposure. When the bullet has entered the flank or back, and ranged across or diagonally across the abdomen, I should always prefer a median incision, except when the liver is probably the only organ penetrated. An incision through the median line or semilunar line saves time, as it can be enlarged and closed more quickly than when several layers of abdominal muscle have been opened; it permits of a more extensive and thorough examination of the abdominal contents, and also of a better cleansing technique before closing the abdomen.

7. After the abdomen is opened, the conditions which present themselves at this time will determine your further steps in the operation. If a large quantity of blood is encountered, the first indication will be to stop the hemorrhage. To do this the small intestine must be withdrawn from the abdominal cavity, and surrounded and covered with hot, wet gauze, the blood then removed from the peritoneum, and the source of hemorrhage searched for. When the solid organs are not in-

volved in the injury, the most frequent source of hemorrhage is probably the mesentery, and until the small intestine has been withdrawn from the abdominal cavity, we have no opportunity of making a careful examination of the mesentery. If the vessel causing the hemorrhage can be ligated or sutured, this should be done at once. When the hemorrhage is taking place from the solid organs, as the liver, spleen, or kidney, we should first attempt to control it by packing the damaged tissue with gauze, but in the case of the spleen or kidney this will not often prove successful, and the removal of the organ will then be demanded. Hemorrhage having been controlled, we will next search for perforations in the alimentary tract. It is well here to start with a definite system, and, beginning with the stomach, follow the small intestine throughout its windings, and then go to the large intestine. As each perforation is found it is immediately closed with the Lembert sutures, catgut or silk being employed for this.

The practice of inflating the intestine by means of hydrogen introduced in the rectum, for the purpose of demonstrating the points of perforation in the alimentary tract, is, to my mind, distinctly bad surgery. It wastes time, it increases fecal extravasation, and so distends the intestines that it may be impossible to return them to the abdominal cavity until they have been emptied of the gas. If your abdominal incision is of proper size and your search systematic, perforations of the bowel will not escape you. Sometimes the intestine will be so greatly damaged that a simple closure of the opening would cause stricture or sharp kinking of the gut, leading to a later obstruction of the bowel. This is particularly liable to occur in marginal wounds of the mesenteric border. Under such circumstances a resection of the gut is necessary, but before proceeding to it, examine the intestine for two or three feet above and below, to see that there are no further wounds of this severe type. If you find one or more, it will be safer to include all the damaged area in a single resection, provided you do not remove more than thirty or forty inches of gut, rather than make two or more resections within a short distance of each other. If the anterior wall of the stomach is perforated, close it in the same manner as a wound of the intestine, and then break through the gastrocolic omentum to examine the posterior wall for a wound. From the anterior wound no attempt should be made to locate an injury to the posterior wall, for such a procedure would necessitate the soiling of the hands of the operator, and also endanger the peritoneum by forcing out the stomach contents. While you are carrying on these necessary procedures, it must be the duty of an assistant to keep the bowel exposed outside the abdominal cavity moist and warm, by repeatedly renewing the hot, wet gauze surrounding it. Having repaired all the damage, we flush the abdominal cavity liberally with hot salt solution, and also carefully douche the intestines which have been brought outside of the abdomen with the same. The intestines are then returned to the abdominal cavity, and as much salt solution as possible allowed to remain within the peritoneum.

8. *Search for the Bullet.* If the bullet is not encountered when we are examining the abdominal organs for wounds, it presumably has passed outside of the peritoneal cavity and lodged in muscular tissue or bone. In such a position it is practically out of harm's way, and when the patient's condition is serious no time should be lost in a further search for it. At some later period, when convalescence is established, the X-ray will easily show us where the bullet has lodged, and it may then be removed with safety to the patient.

9. *Drainage.* In operating for gunshot wounds in other portions of the body, it has always been my practice to treat the track of the bullet as septic until it has proved itself otherwise, and I have always drained such wounds. If, in addition to a septic bullet, the alimentary canal has been opened, the indications for drainage become doubly imperative. When the bullet has penetrated the lesser peritoneal cavity, as in wounds through the stomach, part of the duodenum, and the upper portion of the transverse colon, I believe that a counter opening should be made in the flank, in order that this cavity may be perfectly drained. The danger of infecting the peritoneum from outside sources through the drainage-tube is certainly very slight when compared with the dangers arising from the presence of septic material in such a closed cavity.

10. *Closing the Wound.* As the patient will generally be in a precarious condition, it is well not to spend much time in closing the abdominal wound, and for this reason a through-and-through suture of silkworm-gut is probably the best we can use, although where time is no object a layer suture will be more apt to prevent future hernia.

11. *After-treatment.* For the first twenty-four hours the tube has to be very carefully attended to and thoroughly cleaned as often as it fills with fluid. During this time nothing is given to the patient by the mouth, and any drugs which we find it necessary to administer should be given hypodermically. At the end of twenty-four hours, except in wounds of the stomach, it is my custom to administer calomel, with a small quantity of water, and to have the bowels moved as soon as possible, either by enema or by the administration of repeated small doses of salts. If the patient's condition is such that food is imperative, we can use the lower bowel for this purpose. As soon as the bowels have moved, small amounts of nourishment may be given by the mouth at frequent intervals, and if no untoward symptoms present themselves, like distention, pain, etc., the amount of nourishment may be rapidly increased. When the drainage-tube has ceased to fill it must be withdrawn. The complication most to be feared is, of course, obstruction of the bowels, and

for combating this we have to use energetic cathartics, with frequently repeated enemata. For the rest, the after-treatment is similar to that followed in all cases of laparotomy.

In closing, let me recapitulate briefly some of the most important principles in the treatment of this grave lesion:

1. Remove the patient at once to the nearest place where a clean operation may be undertaken.
2. Assure yourself positively that penetration has taken place.
3. Having demonstrated this fact, always open the abdomen and search for injuries, and make this search systematic.
4. Never wait for symptoms to tell you that profuse hemorrhage or intestinal perforation has taken place, for by that time operation will usually be useless.

Lastly, remember that cleanliness and thoroughness must never be sacrificed to speed. These two are absolute essentials of success, while speed is no longer an important factor since the introduction of normal salt solution.

REPORT OF A CASE OF SPORADIC TRICHINOSIS.

By John Chalmers Da Costa, M.D.,
of Philadelphia,
and
Rae Shepard Dorsett, M.D.,
of Philadelphia.

The following report presents many interesting and some important points.

The patient, T. M., was admitted into St. Joseph's Hospital, March 6, 1901. He is white, unmarried, and twenty years of age. His mother died of phthisis. His father and only brother are living and well. He had measles and whooping-cough in childhood, but never suffered from any other serious sickness. Never uses alcohol, and smokes moderately. The young man says that the right lower extremity has always been distinctly larger than the left, and his father confirms this statement. When thirteen years of age he left school and began work as a delivery clerk for a dry-goods house. He followed this occupation until September, 1900, when he became an assistant to a milk dealer. He did not suffer at any time during the summer with gastro-intestinal disturbance. Early in August, 1900, he took a holiday and started for Atlantic City upon a bicycle. On the meadows about Atlantic City he dismounted from his wheel and stood for a time to wait for the passage of a railroad train across the path. While standing, another bicyclist ran into his machine, and the pedal of the second bicycle struck T. M. upon the calf of the right leg. The blow caused much pain and disablement, but did not break the skin. After a wait of half an hour he proceeded to Atlantic City upon the rear seat of a tandem bicycle. On reaching his destination he went to bed for several hours. At the termination of the rest, in spite of the fact that the calf was swollen and somewhat painful, he arose from bed, went out, put on a bathing suit, and went in to bathe. He states that while walking along the beach someone called his attention to the fact that blood was running down his leg. The blood flowed freely for ten minutes, and did not come from a cut, but "flowed through the pores." This remarkable statement he iterates and reiterates. He returned to the city on the afternoon train. The leg was somewhat sore for a few days, but he went back to his work. The swelling diminished, but did not entirely disappear. For almost four months he suffered no inconvenience with the leg.

In the early part of January, 1901, he noticed that the swelling was increasing. During January and February the size of the calf of his right leg increased very much, and during February he began to suffer from a sense of soreness on walking and from attacks of cramp-like pain at night. If the leg were kept in a flexed position for some time it could be extended with difficulty, and the effort was productive of acute, crampy pain.

Examination on admission: The calf of the right leg is much enlarged, and the gastrocnemius muscle from origin to insertion is clearly traced even when in repose. When he rises on the toes the muscle bellies out in the most marked manner. Muscular movements produce soreness, but no acute pain. While at rest there is no spontaneous pain during the day, but he has cramps at night. There is no tenderness of the muscle and no œdema of the skin. The movements are not notably interfered with; he is clumsy, but is not lame. The swelling is of uniform consistence, does not pulsate, and feels like a mass of thick rubber. The cutaneous veins are much dilated. The groups of muscular fibres can be distinctly outlined under the skin, as though no fascia intervened. The thigh is slightly larger than the opposite thigh, and the foot is somewhat larger than its fellow, but in neither the thigh nor foot is there pain or tenderness. The temperature is normal, the bowels are regular, his appetite and digestion are good, the urinary examination is negative; the lungs and heart are normal. He complains of nothing but the swollen calf.

During the next three weeks the temperature remained normal. An examination of the blood showed about 12,000 leucocytes, 4,300,000 erythrocytes, 60 per cent. of hæmoglobin, and no increase of eosinophiles.

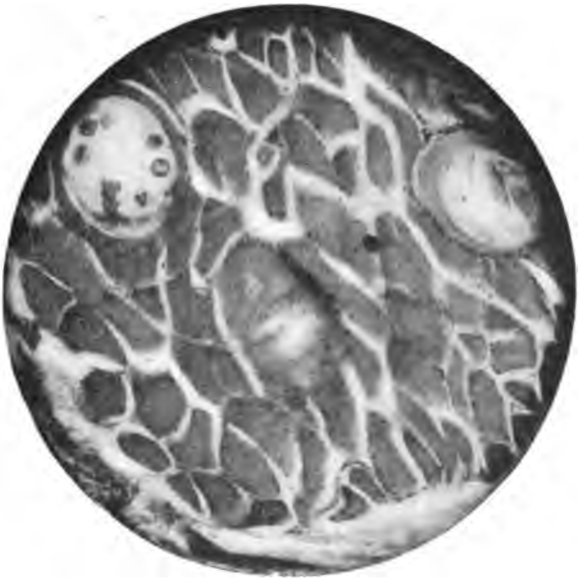
It was observed, however, that the thigh was undoubtedly increasing in size, and so were the flexor muscles of the sole of the foot. In the thigh both extensors and flexors were enlarged, but there was neither pain nor tenderness. In the foot and leg the flexors alone were obviously involved. The pain continued as before in the leg, but there was no tenderness, and the foot was free from any uneasiness.

We were much puzzled as to the diagnosis, and invited Dr. Dercum to discuss the case with us. The alleged bleeding through an unbroken skin was eliminated from any relation to the diagnosis. We believed that it was due to a small rupture in a varicose vein.

At first we had thought it possible that the injury had partly ruptured the muscular sheath, the rupture having subsequently extended and the entire muscle having emerged as a hernia. This view, which never seemed very probable, because of the lack of marked functional impairment, and because of the fact that we were unable to feel the rigid margins of torn sheath, became quite untenable when the other muscles were found to be involved. It was certainly not pseudohypertrophic paralysis or sarcoma. There was obvious muscular hypertrophy. and possibly myositis, and the entire absence of fever was against infective polymyositis. We determined to make an incision and remove a piece of the gastrocnemius muscle.

March 27*th*. An incision was made. The muscular sheath was found intact. A bit of muscle was removed. It contained some white spots visible to the naked eye. Dr. Rosenberger examined the piece of muscle microscopically and found it swarming with embryo trichinæ. (See Fig. 1.)

FIG. 1.



Section of gastrocnemius muscle. Heidenhain fixation, hæmatoxylin and picric acid. Photomicrograph; Leitz 8 mm. objective, Zeiss objective eye-piece. In the upper part of the field is shown a capsule containing oblique and transverse sections of a coiled trichinæ. In the centre of the field is a calcifying capsule, near the margin of which is a collection of lymphoid cells. The parasite in the lower left quadrant of the field is beginning to disintegrate.

Subsequent to receiving the pathologist's report renewed questioning of the patient developed the statements that he had never eaten pork until going to live with the milk dealer, but after this time (September 1st) he had eaten pork, on an average, four times a week. He stated that he never ate raw ham or sausage—only cooked pork.

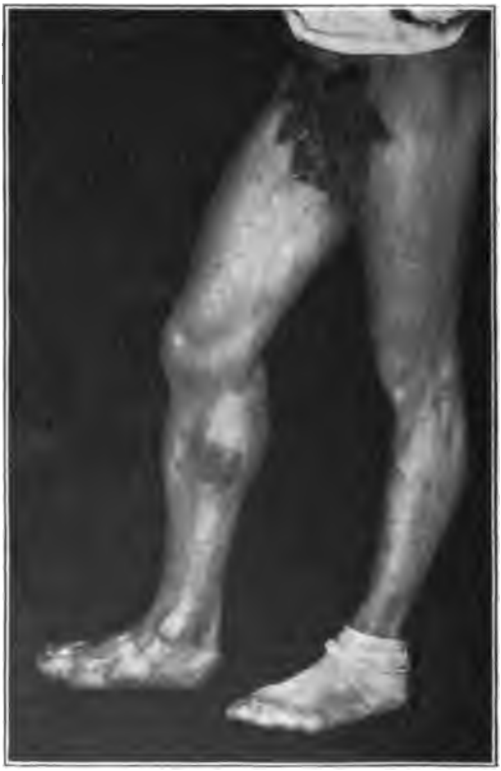
Figs. 2, 3, and 4 show photographs of the patient taken April 1st.

Repeated blood examinations made by Dr. Rosenberger and Dr. John C. Da Costa, Jr., showed a gradual advance in the number of leucocytes. For instance: 12,600 on April 3d, 17,600 on April 11th, 21,500 on May 4th. There has at no time been an increase in eosinophiles noted. The blood report on May 4th is as follows: 69 per cent. polynuclear, 3.5 per cent. eosinophiles, 22.5 per cent. lymphocytes, 5 per cent. hyalin; erythrocytes, 5,212,800; leucocytes, 21,500; hæmoglobin, 75 per cent.

Up to the present time (June 27th) the right lower extremity has continued to increase in size. Recently the left lower extremity has begun to enlarge, but is not the seat of pain or tenderness.

April 5th. The measurements were as follows: Maximum circumference of right leg, 15 inches; maximum circumference of left leg, 13 inches; circumference of right thigh 5½ inches above upper margin of patella, 18 inches; circumference of left thigh at the same level, 15½ inches.

FIG. 2.



22*d.* Measurements: Of each thigh, same as April 5th; of right leg, one-half inch greater.

27*th.* A bit of the left deltoid muscle was removed, and was found to be swarming with trichinæ, although the muscle was not painful and not obviously enlarged.

May 4th. Right leg, 15¾ inches; left leg, 13½ inches; right thigh, 18¾ inches; left thigh, 15¾ inches.

Patient returned home the 1st of May, and whereas the swelling has not diminished in the slightest, he feels very comfortable, does not suffer to any degree from cramp, walks freely and easily, and regards himself as in excellent health except the swelling of his right lower extremity.

FIG. 3.

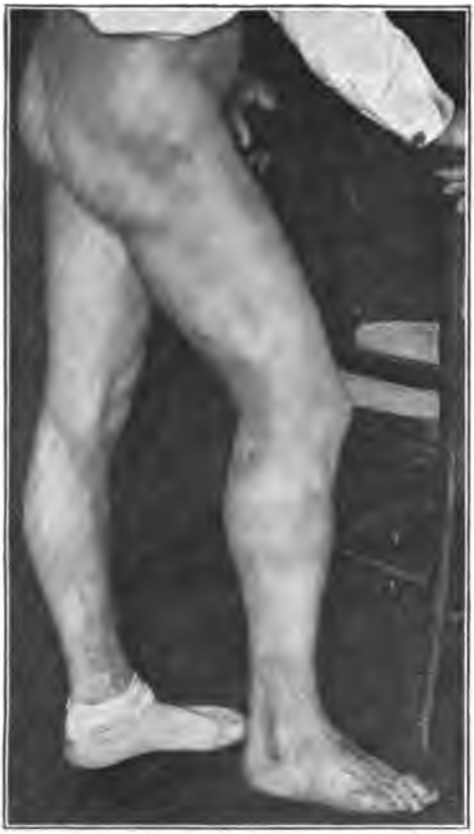
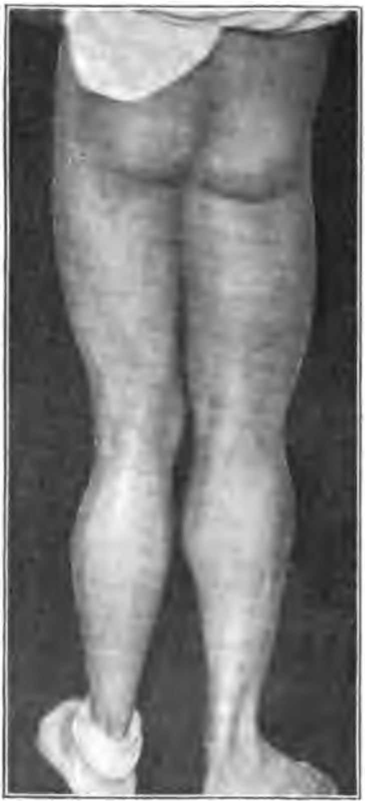


FIG. 4.



The particular features of interest in this case are that a traumatism preceded the apparent onset of the muscular trouble; that the pain in the muscle was slight; that tenderness of the muscle and œdema of the skin were absent; that no antecedent gastro-intestinal attack occurred; that fever was absent; that, in spite of wide-spread invasion, some diseased muscles (the deltoid) did not appear to be swollen and were not tender or painful, and other invaded muscles (the opposite lower extremities) were enlarged, but gave no evidence of pain; finally, that eosinophilia was never noted.

The possible relation of the traumatism to the subsequent condition is a point of decided interest. The injury was received early in August.

Some swelling remained, and early in January it began to increase. Can we suppose that the seat of injury constituted a point of least resistance toward the larvæ trichinæ just as an injury often does toward micro-organisms. The fact that pork had never been eaten until September seems to render untenable the suggestion that trichinæ encapsulated in the muscle were set free by the injury, even if such a happening were possible. There is a third view: that is, that the injury had nothing whatever to do with the origin in the calf, the association being casual and not causal; but it is at least peculiar that the disease should begin in such an unusual situation as the calf, and that in this very situation there should have been severe damage inflicted a few months before.

The absence of eosinophilia is proof that this supposed diagnostic test is not conclusive. It may be usually present, but is certainly sometimes absent.

The fact that muscles can contain numerous trichinæ without obvious signs being engendered has been observed in other cases.

The conclusion is that in a doubtful case of muscle enlargement we must think of trichinosis as a cause, and must confirm or set aside this diagnosis by incision, removal of a piece of muscle, and examination of the piece removed by means of a microscope.

The report of Dr. Randal C. Rosenberger is appended.

REPORT UPON A CASE OF TRICHINOSIS, WITH REMARKS ON (1) TRICHINOSIS AND (2) EOSINOPHILIA.[1]

Pathological Report. The specimen consists of a small, irregular cube of muscular tissue, each side measuring 2 cm.

A small portion was fixed in 1 per cent. osmic acid, dehydrated, and embedded in paraffin; the remainder of the specimen was fixed in Heidenhain's solution, dehydrated, and embedded in paraffin.

Sections were cut and examined in the unstained condition (those fixed in osmic acid); others were stained with hæmatoxylin and picric acid, hæmatoxylin and eosin, and with Van Gieson's mixture.

Upon microscopical examination the specimen is seen to be made up of transverse, longitudinal, and oblique sections of striated muscle.

Some fibres show cloudy swelling (the striations are not demonstrable), while others are irregular and wavy. Here and there are small areas in which fragmented, split fibres are seen. The muscle nuclei are for the most part normal, but in some areas a notable proliferation is clearly in progress. Small and large recent hemorrhages are seen, mostly between bundles of fibres, while one or two extend into and between the individual fibres. Increase in the amount of connective tissue is evident in some areas, and large numbers of small round-cells and spindle-shaped cells, with rod and irregular wavy nuclei, are present.

Between and sometimes in the muscle fibres encapsulated parasites are seen. In some capsules only transverse sections of the parasite can be seen; while in others longitudinal; and in still others the whole parasite can be observed arranged in a spiral or coiled condition. As many as eight parasites can be seen in one field with a two-thirds inch objective and one-inch eye-piece (Bausch and Lomb).

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[1] Read before the Pathological Society of Philadelphia by Dr. Randal C. Rosenberger.

The capsules contain, besides the parasites, a certain quantity of granular material, most evident at each end, a few small, oval, apparently vacuolated cells, and an occasional small round-cell.

Around the capsule is seen in many areas a marked round-cell accumulation, with some few spindle-shaped cells; other capsules show this change to only a slight degree.

A few capsules are devoid of parasites; the walls of such capsules are intensely thickened, and some contain vacuolated cells and granular detritus; the latter may be calcareous matter.

Mast cells are abundantly scattered throughout the specimen.

Sometimes three and four parasites are found within one capsule; in the sections studied in the case here reported but one parasite could be identified in any capsule

The following blood-counts were made:

1. April 3, 1901.

Hæmoglobin	48 per ct.
Erythrocytes	4,336,000
Leucocytes	12,680

Differential Count of Leucocytes.

Finely granular oxyphiles	65.5 per ct.
Coarsely granular oxyphiles (eosinophiles)	4.0 "
Lymphocytes	21.0 "
Hyalin	9.0 "
Basophiles	0.5 "

2. April 11, 1901.

Hæmoglobin	80 per ct.
Erythrocytes	4,275,000
Leucocytes	17,600

Differential Count of Leucocytes.

Finely granular oxyphiles	63.0 per ct.
Coarsely granular oxyphiles (eosinophiles)	2.5 "
Lymphocytes	27.5 "
Hyalin	7.0 "
Basophiles	0.0 "

3. April 21, 1901.

Hæmoglobin	72 per ct.
Erythrocytes	5,200,000
Leucocytes	20,000

Differential Count of Leucocytes.

Finely granular oxyphiles	68.5 per ct.
Coarsely granular oxyphiles (eosinophiles)	3.0 "
Lymphocytes	22.5 "
Hyalin	6.0 "

4. May 4, 1901.

Hæmoglobin	75 per ct.
Erythrocytes	5,212,000
Leucocytes	21,500

Differential Count of Leucocytes.

Finely granular oxyphiles	69.0	per ct.
Coarsely granular oxyphiles (eosinophiles)	3.5	"
Lymphocytes	22 5	"
Hyalin	5.0	"

The granules of the finely granular oxyphiles were generally markedly oxyphilic, but could not be taken for eosinophiles.

Remarks on Trichinosis. In 1822 Tiedemann, and in 1832 Hilton, noticed calcified cysts in the muscle. Leidy, in 1847, first found the trichina spiralis in pork.

In 1845 Owens discovered the trichina spiralis in a cadaver in the dissecting-room, and in 1848 the same parasite was found by Herbst.

It is well known that Zenker,[1] in 1860, was the first to call attention to the disease trichinosis, and almost at the same time Leuckhart confirmed the relationship of the parasite as a cause of the disease. In 1862 Friedreich[2] first diagnosticated the affection and experimentally determined the presence of the parasites in the living subject.

In experiments upon birds the trichinæ advanced in development in the intestine, but failed to invade the muscular system.

Embryo trichinæ are generally present in the intercostal muscles, muscles of the eye, larynx, and tongue, but can be found in almost any muscle of the body. In the case just reported the most severe infection seems to be localized in the gastrocnemius muscle, although sections of the deltoid also show the presence of the parasites.

Not only do the trichinæ encyst themselves in the voluntary muscles, but also in the panniculus adiposus and in the coats of the intestine. In the larger muscles the parasites are most numerous near their tendinous ends. The heart rarely contains trichinæ. The parasite possesses great powers of resistance to putrefaction, being found alive one hundred days after exposure; they survive three days' exposure to temperatures of 22° to 25° C. According to Perroncito,[3] the parasite resists a temperature of 48° to 50° C. for only a few minutes; other observers, however, claim that a temperature of 60°, 70°, or 80° C. is necessary to kill.

According to Roberts,[4] the muscle fibres involved are generally, upon microscopical examination, found to be more or less destroyed and the interstitial connective tissue increased.

Dr. Sutton,[5] harpooning a small mass of gastrocnemius muscle in a fatal case of trichinosis, found it swarming with trichinæ, "estimated at more than 100,000 to the square inch;" the parasites were in active motion, "coiling and uncoiling."

Tyson[6] mentions that the capsule may undergo fatty degeneration, which takes place at times early, but may be delayed for years. The worm-cyst lies usually with the long axis parallel to the muscle fibres.

A. M. Lewin[7] points out that trichinal myositis has its seat entirely in the muscle elements, whereas anthrax myositis is confined to the connective tissue. In Dr. Da Costa's case the increase in connective tissue seems to be between as well as in the muscle fibres.

R. Langerhans claims that trichinæ, together with their capsules, are subject to degenerative changes, and eventually reach a stage of elimination from their host. He further claims that recovery is never complete until the total elimination of both parasite and capsule takes place.

The oval cells seen within the capsules are, according to Heller,[8] "oval, vesicular-shaped muscle nuclei," formed by the thickened sarcolemma.

The œdema of the parts involved is said by Colberg[9] to be due to the obliteration of the capillaries of the muscles in which the trichinæ become embedded. Klob[10] suggests that the œdema may be produced by the lymphatic channels becoming plugged with the parasites, the lymph stream being thus obstructed. Hamilton[11] thinks that the œdema is of an inflammatory nature, due to the irritation caused by the parasites.

According to Sterling and Verco,[12] the capsule of the cyst is chitinous and lamellated, varying a good deal in thickness according to the part of the cyst examined and to its age, being always thickest at the poles and in the oldest cysts, least dense and most transparent in young cysts and about the equator. They also mention that as many as six or seven trichinæ may be found in a common capsule.

Pagenstecher, Chatin, Cerfontaine, and Askanazy[14] state that the female trichinæ penetrate into the intestinal villi and deposit their embryos in the lymph vessels, whence their migration occurs.

Remarks on Eosinophilia. The blood-counts here recorded do not show an unusual increase in the percentage of eosinophiles.

Brown[13] claims that there is constantly a relative increase in the eosinophiles, which may reach 68 per cent.

Eosinophilia is by no means pathognomonic of trichinosis, as the same condition is noticed in other processes.

Turk, in pneumonia, found a post-critical eosinophilia of 5.67 per cent.; after acute articular rheumatism, 9.37 per cent. Even after the injection of tuberculin eosinophilia may be noticed, and Zappert in several cases records 26.9 per cent. of eosinophiles.

Osler[15] in five cases of trichinosis (diagnosis confirmed by finding the parasites in the muscles) found quite a pronounced eosinophilia in each case. In the first case T. R. Brown (the clinical clerk) gives 37 per cent. eosinophiles. Up to the date of the patient's discharge the eosinophiles averaged 16.8 per cent. The second case, counted by Dr. Futcher, showed 44 per cent. eosinophiles. The third case, counted by Dr. Gwyn, showed 45 per cent. eosinophiles. The fourth case, counted by Dr. Thayer, showed 48 per cent. eosinophiles. The fifth case, counted by Dr. Gwyn, showed from 22 to 36 per cent. eosinophiles, and after the "patient had been up and about for three weeks" the eosinophiles were more than 60 per cent.

Sears,[16] reporting a case of trichinosis, found in the first count 17.5 per cent, and in a second count 13 per cent. of eosinophiles. A well-marked urticarial eruption was present over the trunk and thighs.

In Lambert's and Brook's case of trichinosis, quoted by Ewing,[17] there was no evidence of transformation of neutrophiles into eosinophiles, although some of the eosinophile granules were unusually small.

Blumer reports a case in which there was 50 per cent. eosinophiles; a recovering case by Brook gave 83 per cent. Ewing claims that from 40 to 60 per cent. are usually found, but at some periods they may fall to 8 or 10 per cent. The eosinophilia is usually persistent, 15 per cent. remaining after four and a half months in a case reported by Stump, and 34 per cent. after five months in a case reported by Brown.

R. J. Patek[18] reports a case in which there were 30 per cent. eosinophiles, the trichina spiralis being found in a sample of sausage from which the case had its origin.

In infections by other animal parasites, as the anchylostoma duodenale, Muller and Rieder found 8.2 per cent. to 9.7 per cent. of eosinophiles. Zappert also noticed eosinophilia in the same condition.

Bucklers[19] found 16 per cent. eosinophiles in a case of oxyuris vermicularis; 19 per cent. in ascarides. Lichtenstein found 3.4 per cent. in a case of tænia mediocanellata, and 72 per cent. in a case of anchylostomiasis. He also reports 13.5 per cent. of eosinophiles in a case of anguillula stercoralis.

Grawitz regards the increase of eosinophiles in afebrile stages of malaria as of diagnostic import. Zappert, in a case of malaria one day after the last attack, found 20.34 per cent. eosinophiles.

Engel, in varicella, when the pustules were healed, found 16 per cent. eosinophiles. Six per cent. of eosinophiles has been observed by Wickery in von Jaksch's anæmia infantum.

Ehrlich claims that there is a marked eosinophilia in leukæmia, and further states that this is a pathognomonic sign of the disease.

Reinbach found an increase in the number of eosinophiles in the blood of patients suffering from malignant neoplasms. In a case of sarcoma of the forearm, a case of sarcoma of the thigh, and a case of sarcoma of the abdomen the percentage of eosinophiles ranged from 7 to 10 per cent.

Neusser considers eosinophilia as one of the diagnostic signs of sarcoma of the bone-marrow, and he finds that it is met with in osteomalacia.

In one case of lymphosarcoma of the neck, with metastasis in the bone-marrow, he found 60,000 eosinophiles per c.mm.

Exclusion of the splenic function may also be followed by eosinophilia. After the internal administration of camphor in two cases of chlorosis Van Noorden noticed an increase of eosinophiles up to 9 per cent. In bronchial asthma Gollasch has found from 10 per cent. to 20 per cent. eosinophiles. In skin diseases (prurigo and psoriasis) Canon noticed in a large number of cases 17 per cent. eosinophiles. In a marked case of urticaria Lazarus found 60 per cent. eosinophiles.

Laptschinsky[20] mentions the presence of a very large number of coarsely granular leucocytes (eosinophiles?) in a case of relapsing fever.

Gabritschensky found 11 to 22 per cent. eosinophiles in a patient with emphysema, while Fisk reports 14.6 per cent. and Billings 53.6 per cent., the latter out of 8300 cells. Fuchs and Teichmüller found many eosinophile cells in various forms of bronchitis.

Zappert found 8 to 19 per cent. of eosinophiles in four cases of uncomplicated chorea. Cabot also refers to twelve cases showing eosinophilia, and in myxœdema the same observer found 5 per cent. and 4 per cent., respectively, in two cases.

Hock and Schlesinger found 20 per cent. in one subject suffering with rhachitis, and Weiss 16 per cent. in the same disease.

Loos claims that in syphilis the eosinophile cells are increased, especially when the eruption is extensive.

Klein has recently reported a case of hemorrhagic septicæmia in which the eosinophiles reached 76 per cent. in the pleural exudate and 40 per cent. in the blood. Aporti found as high as 18 per cent. eosinophiles during the intermittent pyrexia at the end of the disease.

Turk found 5 per cent. eosinophiles in a case of measles during the second week.

Ewing states that the eosinophiles reach a maximum of 8 to 15 per cent. in the second or third week in scarlet fever, decline slowly, and reach normal at about the sixth week.

To Professor Coplin I wish to extend my sincere thanks for the interest he has shown in the case and for the photomicrographs presented.

I also wish to extend my thanks to Drs. Butler and Dorsett, resident physicians of St. Joseph's Hospital, for their interest manifested in the case and assistance in perfecting the blood-counts.

Discussion by Dr. Coplin. At the Boston meeting of the Association of American Pathologists I suggested the possibility of a recrudescence of lesions. The evidence upon which to base such a view in this case is by no means conclusive, but may be briefly summed up as follows:

1. A more or less local, active lesion (trichina, œdema, myositis, etc.), with trichina present in other muscles, which at the time manifest no symptoms.

2. The absence of marked eosinophilia, so commonly observed in the initial outbreak of trichinosis.

3. The history of injury and the well-known fact that injury induces inflammation of fully encapsulated, but quiescent, parasites of other but similar types—*e. g.*, echinococci.

4. The evident pericapsular lymphoid accumulation, which is apparently most evident around the older capsules, thereby establishing to my mind that such active inflammatory phenomena as are present at this time are not of necessity related to the presence of living trichinæ.

The assumption that different broods of parasites are disseminated from a single mother may seem at first to negative the suggested view that recrudescence is possible, but it does not appear to me as conclusively inconsistent with the idea expressed. It seems quite difficult to understand exactly how one brood could infiltrate some muscles of one extremity to the exclusion of other muscles.

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HISTOLOGICAL DESCRIPTION OF AN EYEBALL, WITH DROPSICAL DEGENERATION OF THE NUCLEI AND PROTOPLASM OF THE ROD AND CONE VISUAL CELLS OF THE RETINA WHICH CLINICALLY SIMULATED GLIOMA.

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AND
E. A. SHUMWAY, M.D,
OF PHILADELPHIA.

THE following case presents features, both clinical and pathological, of sufficient interest to render its record worthy:

A boy, aged two years, was brought to one of us (Dr. de Schweinitz) on January 20, 1900, by his physician, Dr. William L. Estes.

History. The boy is the youngest of six children, all the others being girls. He has always been puny, but has never suffered from any serious illness; he has much trouble with his digestion. The cause of death of the child's paternal grandmother is not known except that it occurred from some acute disease; his maternal grandmother is said to have "died of exhaustion." The paternal grandfather died from a complication of liver and renal affections; the maternal grandfather, now over seventy-five years of age, is in excellent condition, suffering only from occasional attacks of gout. The child's father is an active business man; his mother is somewhat nervous, but in fair condition. She and one daughter suffer from chronic blepharitis.

About two weeks prior to the child's visit for ocular examination it was noted that the pupil of the right eye was slightly dilated, and that through it a yellowish-brown mass was visible. There was no history of injury and none of any affection, local or general, to which this change in the eye could be attributed.

Examination. The child was distinctly undersized and exceedingly pallid, but physical examination failed to reveal chronic disorder of any of the organs of the body, with the exception of the diseased eye, and the only constant menace were attacks of indigestion, which doubtless were frequently brought on by ill-considered diet.

Examination of the Right Eye. Vision was lacking, and light perception could not be demonstrated. The external appearance of the eye presented no anomalies. The pupil was semi-dilated and fixed, but the iris was of good color, resembling that of the opposite side; synechiæ and inflammatory deposits were wanting. The iris responded to a mydriatic, although the pupil did not dilate *ad maximum.* Well forward in the vitreous chamber and behind the pupil space could be seen a yellowish or rather yellowish-pink mass, over which some large vessels could be detected. This apparently filled the entire ophthalmoscopic field, and no red reflex could be demonstrated, nor was there any sign of undetached retina. The tension of the eye was normal or about equal to that of the eye upon the opposite side. The clinical appearances were those of glioma, and the opinion was expressed that the eye should be enucleated. The patient was also examined by Dr. Herman Knapp, who thought the disease was glioma, and, in any event, recommended the enucleation of the eyeball.

Examination of the Left Eye. This was normal in all respects.

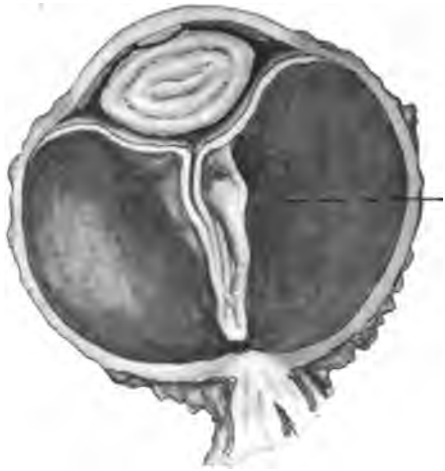
The eyeball was enucleated on January 27, 1900; chloroform narcosis. The healing was prompt, and there was absolutely no unfavorable sign at any period of the convalescence. After the original shock attending the operation of enucleation had passed away, and the necessity for frequent dressings of the eye had disappeared, the child seemed to gain in nutrition. This improvement was in a measure attributed to the removal of the eye. A recent letter, however, from Dr. Estes, the child's physician, states that "he has not improved in nutrition or growth markedly since the operation." He further states, however, that much of the child's indigestion, from which he still suffers, is due to injudicious feeding and indulgence in sweets. There has been no sign of recurrence *in loco* and no metastasis. Once, for a short time, a small œdematous swelling appeared at the bottom of the orbit. This, however, has entirely passed away, and was probably due to the pressure of the edge of the artificial eye. At the present writing, eighteen months after the operation, the child appears to be normal in all respects.

The enucleated eye was immediately placed in a solution of formalin, and after hardening divided and submitted to macroscopical and microscopical examination.

Pathological Report.

Macroscopical Examination. The eyeball measured 21 mm. in its antero-posterior and 22 mm. in its vertical and horizontal diameters. It was divided into two halves by a section passing in a horizontal plane through the centre of the cornea and the optic nerve. The retina was folded closely together in the centre of the globe, attached only at the optic nerve entrance and at the ora serrata. It was moderately thickened, but presented no distinct trace of tumor formation. (Fig. 1.) The subretinal space was filled with a grayish-white exudate; the choroid was in its normal position, and showed on its inner surface on the temporal side a narrow linear pigment mass. Aside from this, no cause could be seen for the retinal detachment. One-half of the specimen was mounted in glycerin jelly, the other half embedded in celloidin for microscopical section.

FIG. 1.



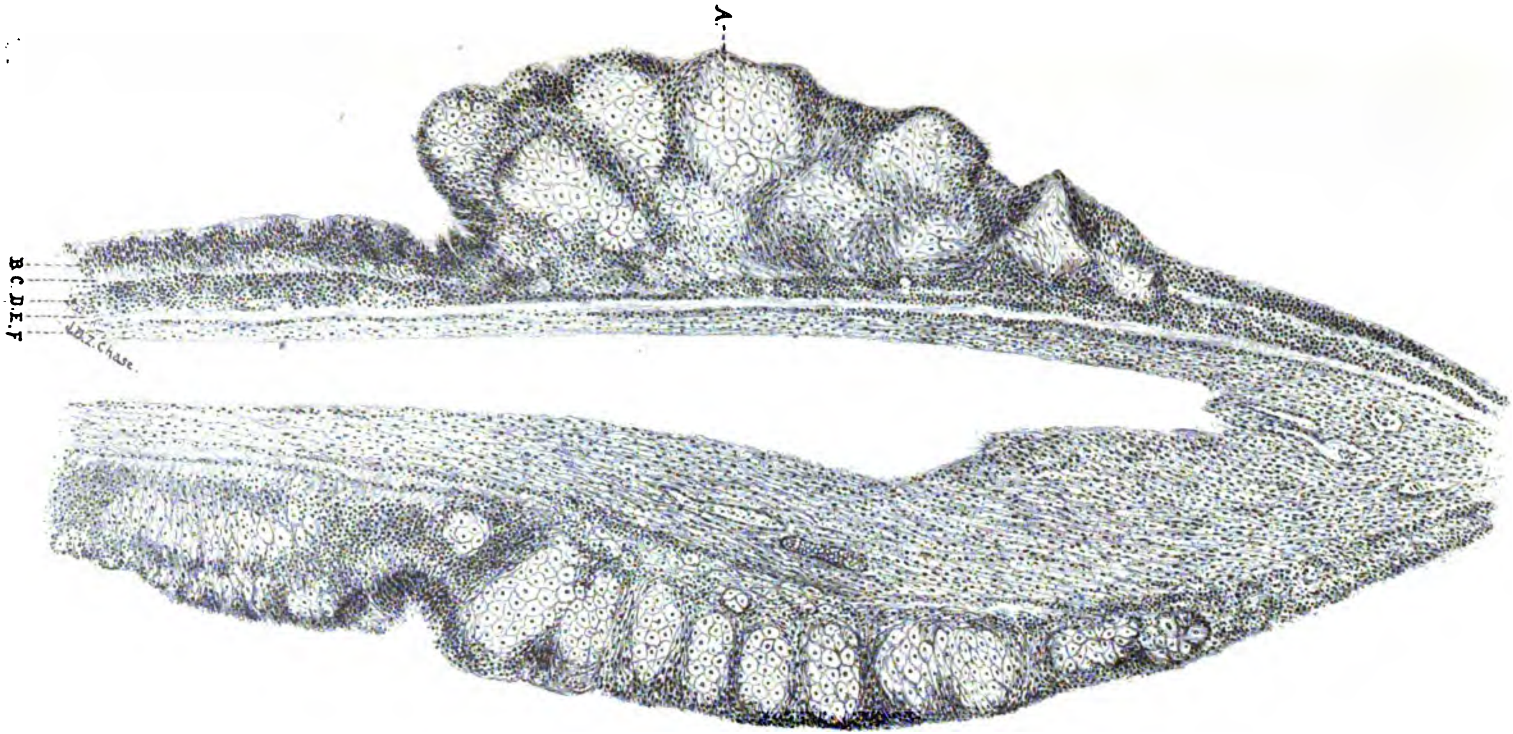
Detached and thickened retina.

Microscopical Examination. The cornea, anterior chamber, ciliary bodies, choroid, and sclera are entirely normal. The iris is partly adherent to the lens, but is otherwise normal and shows no sign of previous infiltration. The retina is in close apposition to the posterior surface of the lens, and the very small vitreous cavity contains a few fine, homogeneous bands, crossing between the inner surface of the retina, which include an occasional oval cell.

The subretinal space is filled with a homogeneous exudate which stains pink with the eosin. Embedded within it are a large number of enormously swollen cells, each of which possesses a shrunken, distorted nucleus, coarse, highly refractive granules, and masses of pigment. The pigment is in fine rods, and distinctly of the type peculiar to the retinal pigment cells. In many places all that can be recognized of the cell is a large, oval vacuole in the exudate, which contains an isolated nucleus and scattered pigment granules. These cells are especially numerous on the temporal side. They have remained attached to the outer edge of the exudate, and consequently have been separated from the choroid by the shrinking of the former, but they evidently represent the line of pigment described on the surface of the choroid in the macroscopical report. The retinal pigment cells form a regular layer, which has remained adherent to the surface of the choroid.

The optic nerve is partially atrophied, but the majority of nerve-fibres retain the Weigert nerve-sheath stain.

FIG. 2.

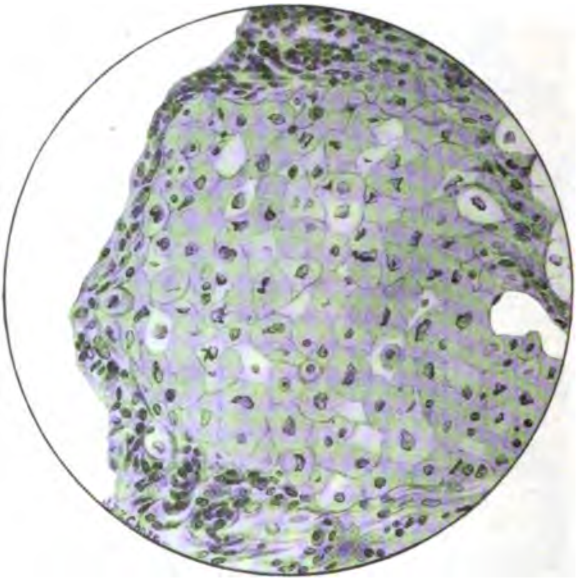


A. Cavities in the external nuclear layer of the retina. B. External nuclear layer. C. External granular layer. D. Internal nuclear layer. E. Internal granular layer. F. Ganglion and nerve-fibre layer. Leitz-Wetzlar objective 8, oc. 8.

The principal changes occur in the retina. It is moderately thickened. The nerve-fibre layer is œdematous, and the supporting fibres of Müller are prominent. The ganglion cells are in an advanced condition of chromatolysis; they are distorted and shrunken, their processes are broken abruptly off, the Nissl granules are absent, and the cell bodies show numerous vacuoles. The rods and cones have entirely disappeared, and the fibres of Müller extend in the form of fine arcades a short distance beyond the limitans externa, and in places show the presence of nuclei similar to those in the external nuclear layer. (Compare Deutschmann's[1] article, *Archiv f. Ophthalmologie*, xxv. 3, and Tartuferi's,[2] in *Centralblatt f. die med. Wissenschaften*, 1882, xx. 801.)

In the nasal half of the retina, commencing 1 mm. from the nerve entrance and running for a distance of about 1.5 mm., is a series of cyst-like spaces, each measuring 0.16 to 0.25 mm. in diameter, situated in the position of the external nuclear layer, which is here absent. A similar series begins in the temporal leaf 3 mm. from the nerve entrance and extends for a distance of 4 mm. (Fig. 2.) For convenience, these spaces have been represented in the drawing as being exactly opposite. In these positions the retina is thickened to nearly double its normal width. The cavities are bounded laterally by the thickened fibres of Müller and externally by the limitans externa retinæ. They are crossed by a fine reticulum, which at first glance gives the appearance of a network of anastomosing fibres of supporting connective tissue. More careful examination, however, showed that this reticulum represents the walls of large, flat cells measuring between 15μ and 30μ in diameter,

FIG. 3.



Detail of structure from A, Fig. 2, showing large flat cells with degenerated nuclei. Leitz-Wetzlar objective 7, oc. 3.

each of which contains a distorted and degenerated nucleus either at the centre or near the periphery; the cell body has a finely granular appearance, more prominent in some cells than in others, but contains no large refractive granules. (Fig. 3.)

In sections stained by the Weigert fibrin-method the cell outlines do not retain the stain. The half of the eyeball which was mounted in the jelly for a macroscopical specimen was subsequently removed from the cup, and a portion of the retina was stained with osmic acid, but the cells were not blackened. The condition was traced through a series of sections, and the same changes were found in approximately the same position. The retina exhibits no sign of inflammatory process.

The explanation of these changes is difficult. The following possibilities have been suggested:

1. They represent a fine network of fibrin such as has been frequently described in retinitis albuminurica. The entire absence, however, of signs of inflammation in the retina, of round-cell infiltration about the vessels, of exudation or hemorrhage, and the negative reaction of the fine network to the Weigert stain, as well as the complete difference in the appearance of the cavities, render this theory untenable.

2. The condition is due to œdema of the retina, the spaces representing cavities between the separated fibres of Müller. Such cystic cavities have been very frequently described in the fibre layer of the retina, in detachment of this membrane, by Leber,[3] Müller,[4] Nordenson,[5] Poncet,[6] Caudron,[7] etc.; but in only two cases have there been found in the outer layers changes similar to those existing in our specimen. In 1882 Tartuferi[2] described, in a case of hemorrhagic glaucoma, "vacuole formation in the cones, due to œdema, which later may widen out and communicate through openings in the limitans externa with spaces in the external nuclear layer, which are likewise filled with serum and surround the cone nucleus on all sides, so that the latter is separated from the neighboring elements." In a case published by Webster,[8] in 1887, Van Gieson speaks of "numerous small, spheroidal cavities in the outer nuclear layer filled with fluid and containing delicate, flattened connective tissue fibres, with wing-like anastomosing processes. These are the fibres of Müller, exposed by the disappearance of the outer nuclei. These small cysts are enclosed between the limitans externa and the inner nuclear layer. There are similar cavities in the inner nuclear layer, but fewer in number." No plates accompany either paper. In our case, however, the minute spaces do not represent cavities formed by the separation of the fibres of Müller, but are distinct cellular elements. In this opinion we are supported by Professors Simon Flexner and George A. Piersol, of the University of Pennsylvania, who have studied the sections carefully. The cellular nature of the process is shown especially where the peculiar formation begins. A few isolated, swollen cells appear in the midst of the cells of the outer nuclear layer, and they gradually become more numerous until they fill out the large spaces described above.

3. They are fat, granular cells, such as are found in the degenerative lesions of the central nervous system (in softening of the brain, etc.). They contain, however, no refractive granules, and are not stained by osmic acid.

4. They are inclosures in an obliquely cut and folded retina of the cells described in the subretinal fluid. Now, although they are of

much the same size, they present an entirely different appearance. They contain no highly refractive granules, and only rarely any pigment, although the two forms of cells are separated in some places only by the limitans externa retinæ.

5. They are due to the burrowing of these cells into the retina, where they have undergone secondary proliferation and lost their pigment and refractive granules. Such a process, however, would be hard to understand.

6. They are a proliferation of the nuclei of the external nuclear layer, and represent a true tumor formation. Such a condition is especially suggested by the overlapping of portions of the retina, as though from an active cell proliferation. The change, however, has occurred in two remote portions of the retina at the same time, and the cells, with their degenerated nuclei, do not have the appearance of actual proliferating cells. A tumor of this character would be unique.

7. They are due to an œdematous or dropsical degeneration of the nuclei of the external nuclear layer. The latter are the nuclei of the rod and cone visual cells, modified epithelial cells derived from the embryonic epiblast, and would be subject to the changes observed in such cells. That the condition is not a fatty metamorphosis is shown by the absence of granules and the negative reaction to osmic acid. Myxomatous degeneration may be likewise excluded, as the cells do not stain typically with hæmatoxylin or thionin. Œdema of the retina is one of the most frequently described conditions in detachment, and in this respect our case forms no exception to the rule. Therefore, it is possible that we have here a localized dropsical degeneration of the nuclei and surrounding protoplasm of the visual cells. This we believe to be the most probable explanation of a change which is certainly of great rarity, if it is not unique. At the same time we cannot exclude entirely the possibility that it is a true tumor formation, and must leave the matter for time and future observation to decide.

A word may be said in regard to the diagnosis from the clinical stand-point. As has been particularly pointed out by Mr. E. Treacher Collins, the following conditions may be mistaken for glioma: Persistence of the posterior part of the fœtal fibrovascular sheath of the lens, masses of tubercle in the choroid, and inflammatory or purulent effusion into the vitreous, following retinitis or cyclitis, usually with detachment of the retina. Although well-marked differential diagnostic points have been established between these affections and glioma of the retina, it is frequently very difficult to come to a definite decision, and, therefore, it is an excellent surgical rule that the eye should be enucleated in case of doubt.

In June, 1889, De Wecker[9] called the attention of the Society of Ophthalmology of Paris to a danger to which young subjects attacked with white degeneration of the retina, or retinitis circinata, are exposed, inasmuch as the disease may be mistaken for glioma. He believes that this affection is not necessarily confined to the eyes of adults, but may be seen also in infants. Among three observations he cited the case of a girl, aged six years, under his care for two years, during which time, although the lesions resembled glioma of the retina, they had not increased, and the intra-ocular tension had not been augmented. This eye was afterward enucleated by one of De Wecker's confrères, who, in addition to the plaques of atrophied choroid and degenerated retina described by De Wecker, found a small ossifying fibroma. In the present instance the clinical appearances were exactly those of glioma; and, although, fortunately for the child, this malignant form of growth was not discovered with the microscope, in the light of the report already cited, it is not absolutely sure that tumor formation is entirely absent. The enucleation, therefore, was a wise procedure.

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COMBINED CLINICAL REPORT OF TWO CASES OF AORTIC ANEURISM TREATED BY MEANS OF SILVER WIRE AND ELECTRICITY.[1]

(1) THE TREATMENT OF AORTIC ANEURISM BY MEANS OF SILVER WIRE AND ELECTRICITY, WITH REPORT OF CASES.

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THE literature of this subject has been so thoroughly collected and studied by D. D. Stewart and Guy L. Hunner in their recent elaborate papers[2] that it is unnecessary for me to go over the ground again. I shall merely mention a few prominent points.

The method of treating aneurisms of the aorta by means of a fine wire introduced through a hollow needle and coiled within the sac was first suggested and carried out in 1864 by Charles H. Moore, of the Middlesex Hospital. Corradi, in 1879, added much to the effectiveness of the procedure by passing a strong galvanic current through the wire, thus promoting more rapid and firm coagulation. It has hence been designated "the Moore-Corradi operation." D. D. Stewart, of Philadelphia, has done more than anyone else to bring the operation into prominence, perfect its technique, and emphasize its possibilities.

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[1] Read before the American Surgical Association, at Baltimore.

[2] Hunner, Johns Hopkins Hospital Bulletin, November, 1900. Stewart, AMERICAN JOURNAL OF THE MEDICAL SCIENCES, October, 1892; Ibid., August, 1896; Philadelphia Medical Journal, November 12, 1898.

There have been reported, according to Hunner, fourteen cases in which wire alone was used, with three recoveries, although one patient subsequently died from rupture of the aorta below the tumor, and twenty-three cases in which both wire and galvanism were employed, with four recoveries; in all, thirty-seven cases, with seven recoveries. There have also been a number of encouraging improvements.

Apparently this is not a brilliant showing, but it must be borne in mind that many of the aneurisms were extremely unfavorable for operation. In some instances the sac was fusiform or had several compartments, or was on the point of bursting; while in others the patients were nearly dead from exhaustion or from pressure upon the trachea, and occasionally a poor technique seems to have been directly at fault. Failure, under such circumstances, cannot excite surprise; and it must not be lost sight of that no other treatment can furnish results at all comparable to these.

To obtain the best results it seems evident that the cases should be carefully selected. The aneurism should be sacculated, not fusiform; without too large an opening, and with but one compartment. It should not have progressed too far toward rupture, and the patient should have sufficient vitality to enable him to live through the tedious process of cure. It is scarcely necessary to state that the operation is practically confined to aneurisms not amenable to ordinary surgical procedures—*i. e.*, aneurisms of the abdominal aorta, the thoracic aorta, the innominate artery, etc., the first named requiring a preliminary cœliotomy.

An accurate diagnosis is of the utmost importance; but, in spite of the greatest care, mistakes are apt to occur. We will hope, however, that when the operation comes into more general use better methods of investigation will arise. Perhaps the X-ray may be of service, as insisted upon by Dudley Tait, of San Francisco.

In addition to reporting two cases of my own, my object is to discuss several points pertaining to the technique, which, according to Stewart, is briefly as follows: Asepsis, local anæsthesia, insertion into the aneurism of an insulated hollow needle, through which is introduced silver wire (about No. 27). It must be well drawn and wound on a spool, to increase its tendency to coil, and from 3 to 20 feet in length, according to the size of the cavity. The wire is then attached to the positive pole of a galvanic battery, the negative electrode, large and well moistened, being applied to the back, and a current of 70 to 80 milliampères passed for from half an hour to an hour and a half. The wire is then cut close to the skin and sunk beneath the surface.

Let us consider in detail some of the questions involved.

CHARACTER OF THE WIRE. Most operators agree that silver wire is preferable to any other. It is easily obtained, inexpensive, is a good transmitter, and becomes sufficiently corroded by the passage of the electric current to insure adhesion of the clot. Steel is said to be too brittle, and soft iron too easily disintegrated. The wire should be fine (about No. 27), because fine wire coils more readily and offers less resistance to electricity and to contraction of the sac. Silver wire varies much in elasticity according to the amount of copper which it contains and the degree to which it is drawn. Hunner lays great stress upon the use of highly drawn wire (from Nos. 8 to 27), containing seventy-five parts of copper to the thousand, making it so hard and springy that it readily retains the coil imparted to it. Stewart also insists upon the use of wire which has been drawn, and both he and Hunner strongly advise winding the wire upon a spool before inserting it. These ideas are founded upon the manner in which various kinds of wire deport themselves when introduced into glass flasks. They claim that much can be learned in this way regarding the behavior of wire in an aneurism, and that no one should operate upon the living until numerous experiments of this kind have been made.

Hunner, in his beautifully illustrated article, shows how ordinary undrawn silver wire arranges itself in large circles around the periphery of a flask without filling the centre, while his highly drawn elastic wire coils itself in the middle of the receptacle.

It is somewhat questionable, however, whether it is advisable to have most of the wire in the centre and comparatively little in contact with the walls of an aneurism. The firmness of a clot, its stability, and its capacity for organization must depend somewhat upon the support derived from mural implantation. A clot suspended in the centre of the sac would be of little use, however satisfactory its consistency. In addition we must not forget that an aneurism cures itself by the deposition of clots about its circumference, and that the electrolytic effect of galvanism upon the sac, as demonstrated by Macewen, promotes the accumulation of leucocytes and the formation of firm, white, readily organizing coagula.

But aside from these more or less theoretical considerations, it occurred to me that glass flasks do not represent actual conditions, and that we can draw no reliable conclusions from their employment. In repeating Hunner's experiments—which I did with wire obtained directly from him as well as with ordinary silver wire, both drawn and undrawn—I found that the strands slipped easily about within the smooth, hard, glass-lined cavity, and arranged themselves always in a definite manner, as he has described. The inside of an aneurism, however, is not hard and smooth; it is often irregular and coated with more or less rough layers of clot, so that the wire would easily catch and be deflected from its natural course; also, the coils could not rotate within the cavity and adjust themselves when pushed upon by the entrance of a fresh portion, as occurs in a flask.

In order to represent more accurately the conditions as they really exist, I obtained a large Colorado turnip, the size and shape of a flask of 500 c.c. This I hollowed out through an opening large enough to observe what took place within. The walls were of the consistency of an old, firm clot, and of about the right irregularity and roughness. After running a hollow needle through the side of this "aneurism" I inserted various kinds of wire. My observations convinced me that the glass-flask method had led to erroneous and misleading conclusions. Ordinary undrawn silver wire under these new conditions coiled itself backward and forward and around through the cavity, not only covering the walls to a satisfactory extent, but filling the centre also—totally different from its conduct in a flask. Even wire not previously coiled did almost, if not quite, as well in this regard. The stiff, springy wire obtained from Dr. Hunner formed a good network within the turnip, also, but not so good as the ordinary wire. The meshes were not so evenly distributed over the walls and centre, and when the wire had been wound upon a large spool it was still less effective, quite large open spaces being left within the curl-like rings.

When the needle was directed away from the opening there was little or no tendency on the part of the ordinary wire to escape through it; but a coil or an end of the Hunner wire would often spring suddenly through the hole, like a Jack-in-a-box. I feel that a real danger lurks in these sudden movements from dislodgement of clots, penetration of the aorta, etc. The phenomenon was, of course, still more marked when the needle was directed toward the opening. Through a trap-door in the turnip I was able to extract the coils without disarranging them. I observed that a coil of ordinary soft wire could easily be squeezed together in the hand, and that it remained as it was moulded, while a coil of drawn and alloyed wire (Hunner) was so springy that it resumed its original shape as soon as the pressure was removed.

These experiments convinced me that Hunner and others are mistaken in their deductions. Instead of hard, elastic wire being superior to the ordinary soft variety, the advantage lies just the other way. The elastic wire really possesses certain disadvantages: It kinks in a more annoying manner and breaks more readily; it does not coil so satisfactorily within an aneurism; it is more liable to protrude, sometimes with force, through the aortic opening; its sudden movements during introduction may dislodge dangerous clots; and its inherent springiness would tend to prevent contraction of the sac wall, although I do not lay so much stress upon this as do some. Soft, unalloyed silver wire has another advantage over the harder variety in that it more rapidly loses in size under the influence of the electric current, and becomes much rougher and more brittle. I found this difference quite marked in a séance of but twenty minutes. Wire thus acted upon breaks and crumbles to pieces readily and can offer no appreciable resistance to contraction.

In the course of my experiments I noticed another point of some importance. If the canula is inserted too far into the sac, as we are apt to insert it, the wire has a strong tendency to curl up against the further wall, leaving a more or less clear space surrounding the place of entrance—a spot which often needs strengthening more than others. This may be avoided by just penetrating the aneurism with the needle, and no more.

QUANTITY OF WIRE TO BE USED. Stewart, Hunner, and others confidently assume that it is far better to employ a small amount of wire (from 3 to 10 feet, or at most 20 feet) than a large amount. They are so sure of this that they attribute some of the failures which have occurred to a disregard of this principle. Their theory is based upon the following considerations: 1. Large amounts of wire are unnecessary, smaller pieces producing clots which are just as satisfactory. 2. Much wire tends to prevent contraction of the sac wall, upon which depends the cure. 3. The reported recoveries were obtained with small amounts of wire.

At first sight these points appear convincing, but upon closer inspection it develops that both reasoning and conclusion are open to question.

It seems sufficiently evident that the greater the quantity of wire used the more certainly and quickly will a clot form, and the more firm and lasting will it be, lodged as it is among the meshes of the wire. In fact, if every portion of the sac could be filled completely with wire there would be no room for blood at all, and the aneurism, as such, would cease to exist.

Aneurisms are definitely cured by the gradual replacement of coagula by fibrous tissue, which slowly but firmly contracts. The contractile power of such a mass is certainly considerable, as is seen in scar-tissue in other portions of the body, and is not to be seriously impeded by the presence of a more or less loose coil of fine silver wire, especially if the wire be soft and devoid of spring. This can be more clearly appreciated after crushing such a coil in the hand. Hunner and Stewart admit the power of this contractile force when they assert that it is dangerous to use steel wire because of the likelihood of its breaking and penetrating the sac wall. If steel wire can be broken, soft silver wire can certainly be easily bent into a small compass. But even admitting that contraction would be to a certain extent impeded, it is hard to see what actual harm would be done in the presence of a firm, well-organized clot. To be sure, contraction would sooner reach its limit, a larger bunch of tissue remaining; but as long as this consisted of closely coiled wire, connective tissue, and fibrin no objection could be made to its mere presence. It can here be clearly appreciated that soft, undrawn wire would possess an advantage over that which is hard and springy, as the latter would cause a continuous centrifugal pressure.

It is true that the reported cures have been obtained in cases where small amounts of wire were used; but this fact is misleading, as is shown by a glance at the records as given by Hunner himself. According to these, wiring has been resorted to 37 times, much wire being employed in but 7 instances—*i. e.*, 78 feet, 75 feet (in two sittings), 32 feet, 33 feet, 225 feet, 150 feet, and 32 feet (in three sittings). It is, however, questionable whether such lengths as 32 feet and 33 feet should be considered as "much" wire, when we remember that both Stewart and Hunner recommended as high as 20 feet under certain circumstances. The figures would then stand 33 to 4. For the sake of argument, however, we shall assume that much wire has been used in 7 cases and a small amount in 30. But 4 of these 7 cases must be excluded because of features rendering their consideration absolutely unfair. They are as follows:

Moore's case (78 feet); died of sepsis.

Cayley's case (75 feet); *two* sacs, with a *very* large opening into the main vessel.

White and Gould's case (32 feet); *two* sacs; fusiform aneurism; death from sloughing due to pressure from without.

Abbe's case (150 feet); reversed current in middle of sitting and probably softened clot already formed.

This leaves but three cases—one in which 33 feet were used, one 32 feet, and one 225 feet—*i. e.:*

Hulke's case (33 feet); "desperate condition;" wire did not fill entire sac, which continued to expand in empty portion. If this case shows anything, it is that not enough wire was used.

Finney's case (32 feet in three sittings); no autopsy, and hence we know nothing of the real condition of things within.

Roosevelt's case (225 feet); improved, the tumor becoming firmer; died on twenty-second day, probably of embolism.

It is thus seen that a really large amount of wire has been used in but one case which can be called at all favorable, and in this the patient lived twenty-two days, finally dying of what appeared to be embolism—an accidental complication. In the meantime the patient had improved and the tumor grown more firm.

Hence we are forced to conclude that the employment of considerable wire, within reason, has some theoretical advantages without counterbalancing disadvantages, and that it has never been given a fair trial, the question of "much wire or little wire" still remaining an open one.

STRENGTH OF CURRENT. Stewart and others insist upon the use of rather a strong current—about 70 to 80 milliampères, as a rule. Hunner objects to this, regarding it as dangerous from disintegration of the sac wall, or even of the aorta itself in case of misplacement of the wire. Hunner claims to have demonstrated by his experiments that a current of 10 milliampères, continued for fifteen or twenty minutes, produces practically as large and effective a clot as one of 100 milliampères used for a much longer period. This seems hardly probable on the face of it, and, in addition, in one of my operations coagulation did not occur, as evidenced by the movements of the needle, for some thirty minutes after the beginning of the operation. Hunner's experiments were made in rapidly moving blood in a dog's aorta. Under such conditions we know that clotting of blood is difficult to obtain, as shown by several autopsies in which wire accidentally introduced into the aorta remained perfectly clean; and it must also be considered that, where the circumference of the clots obtained is so small, relative differences are hard to estimate which in larger clots would be quite marked. Such an experiment is hardly a fair test.

In my opinion, more accurate data can be obtained by employing coagulated blood, because in aneurisms the blood does not move with anywhere near the rapidity that it does within the aorta; and, in addition, it has been noted in many operations that blood often clots shortly after turning on the electric current; hence we often operate not only in comparatively stagnant blood, but even in a coagulum.

It will also be admitted, I am sure, that the solid clot, which is, as it were, burned onto the wire, counts for much more in the ultimate result than the soft coagulum which may form around it. I found by conducting experiments in clotted blood that the diameter of the area acted on by a current of 100 milliampères was several times greater than that effected by a current of 10 milliampères during the same length of time—twenty minutes.

The danger of injuring the aorta or the sac wall by a current of 70 or 80 milliampères is probably very remote (so far as known, it has never occurred), and is more than counterbalanced by the advantages obtained.

(As a mere matter of interest, in blood prevented from coagulating by the addition of sulphate of magnesia, I was able to produce but a small amount of coagulum, closely adherent to the wire, and I could detect little, if any, difference between the effects of currents of high power and those of low power.)

According to both Stewart and Hunner, the chief danger in operating upon aneurisms with wire is the clotting of the blood in but a portion of the sac, thus exposing the remainder to increased pressure and possible rupture. This hypothesis, however, does not seem reasonable. A sacculated aneurism, according to the size of its opening, contains a more or less comparatively quiescent pool of blood. When this pool is struck by an impulse from the heart as it passes through the aorta it expands, and this expansion, so say the laws of hydrostatics, is equal in all directions. If a clot forms in a portion of the cavity, this does not increase the pressure upon the remainder of the wall. It does not even increase the general blood-pressure, because nothing is added to the total quantity of blood. In fact, the general blood-pressure, together with that in the aneurism, is often lowered by the considerable loss of blood which may take place during the operation.

In order to convince myself thoroughly on this point I fastened a rubber glove to a fountain-syringe filled with water and elevated the syringe. The glove represented an aneurism, and the force of the water in the douche bag took the place of the pressure of the blood, this force being measurable by the height to which a fine stream of water was projected through a hole in one of the glove fingers. After the insertion of a large, solid body within the glove, to represent a clot, it was noted that the stream projected to exactly the same height as before, thus demonstrating that there was absolutely no increase of pressure.

CONCLUSIONS. 1. Considering the inefficiency of medical treatment, and the comparative efficiency of the use of silver wire and electricity, it is probably better to proceed to the latter at once without wasting valuable time upon the former. This seems all the more desirable when we consider that wiring is not a very dangerous process, and that it is in the early stages of an aneurism, when the sac is still firm and the patient is in good condition, that the best prospect of cure exists.

2. Soft, undrawn, unalloyed silver wire devoid of spring—wire just as it comes from the shop—is preferable to the hard, highly drawn wire alloyed with copper and full of spring. It is hardly necessary to previously coil the wire.

3. It is still an open question as to which is preferable, a large amount of wire or a small amount, with the theoretical advantages in favor of the former.

4. A strong electric current is apparently preferable to a weak one.

5. The canula through which the wire is introduced should be inserted just within the sac, and no further.

6. There is little if any danger of bursting the aneurism from increase of pressure due to coagulation in a portion of the sac only.

The report of the two cases in which I have utilized this method will be found in full in the accompanying article by Dr. J. N. Hall.

To Dr. E. P. Hershey, of Denver, the first to successfully wire an aneurism in Colorado, I desire to express my indebtedness for valuable assistance.

(2) REPORT OF TWO CASES OF ANEURISM TREATED BY WIRING AND ELECTROLYSIS.[1]

By J. N. Hall, M.D.,
of Denver, Colo.

The treatment of aortic aneurisms in general is extremely unsatisfactory, and, from the very nature of the pathological process underlying them, must always remain so to a greater or less degree. Always originating in localized degeneration of the arterial coats, this degeneration is but a few steps more advanced at the seat of the aneurism than elsewhere, for in the internal arteries traumatic injury rarely, if ever, plays the part which it exercises occasionally in peripheral vessels. We should apprehend distinctly that cure of aortic aneurism does not signify as much as cure of many other conditions does, since we cannot hope to cure the general arterial deterioration; yet many patients the subjects of this disease live in comparative comfort for a considerable time, and we may hope, in favorable cases, to prolong this time materially.

Surgical measures are necessarily limited to those aneurisms accessible from the surface, either directly or after opening the abdominal wall. I speak to-day chiefly of those springing from the anterior or lateral surfaces of the ascending portion of the arch of the aorta and of such sacculated character that clotting of their contents would not shut off the direct current through the aorta. A very small percentage of the aneurisms of the arch are of this nature, but, where the diagnosis can be made, the gloomy prognosis of medical treatment should lead us to offer surgical relief.

A review of the characteristics of the aneurisms amenable to such operative measures is of interest. It should be noted that aneurism of the innominate artery must be considered in this connection, since it is intimately associated in many instances with that of the portion of the aorta mentioned.

In a general way, the aneurisms of the ascending portion of the arch eligible for surgical treatment must be those presenting chiefly the signs of growth anteriorly or laterally. These signs are entirely consistent with sacculation of the aneurism. Even though sacculated, if the tumor project from the posterior wall of the ascending aorta it must be looked upon as ineligible for such treatment, not only because of its inaccessibility, but because of the difficulties in the way of the diagnosis.

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[1] Read before the American Therapeutic Society at Washington.

The signs and symptoms found in the aneurisms mentioned as being suitable for treatment are in general those that indicate growth toward the surface, with involvement of the parietes, rather than toward the centre of the chest, with pressure upon internal organs. Thus we have pressure upon the ribs or sternum, with consequent neuritic pain, bulging of the bony parts, a pulsatile and expansile tumor, dulness, diastolic shock, and perhaps auscultatory signs or the inflammation of the skin which precedes ulceration, as in one of our cases.

It is not common in these cases to have dysphagia or pressure upon the trachea or bronchi. Hoarseness or aphonia from pressure on the recurrent laryngeal nerve, pupillary signs from involvement of the sympathetic, and tracheal tugging and diastolic shock, however, may all be present, as in the first case to be reported, without contraindicating the attempt or preventing a successful issue. Inequality of pulse in the two radials, with asynchronism, may occur, owing either to pressure upon or distortion of the orifice of the innominate or subclavian, or to the delay of the pulse-wave in the large sac.

It is quite possible that we may, in selected cases, disregard all of the signs of intrathoracic pressure, for they may come from the pushing back of the vessel by an aneurism bulging anteriorly, as was probably the case in the instance just mentioned, where even slight dysphagia existed.

I do not believe it advisable to attempt surgical measures in these cases unless other features of the case be favorable. Thus I advised against operation, some three years ago, in the case of a woman, aged fifty-six years. She had about such an aneurism as that in the case to be first reported, but a well-marked aortic regurgitation was present, with extensive atheroma. She had advanced tabes dorsalis also. The aneurism itself was eminently fitted for operation, but it was wholly unjustifiable in her condition. I think it possible that a slight aortic regurgitation may be due to deformity of the orifice or imperfect apposition of the leaflets caused by the aneurism, without actual valvular change, in which case treatment might be of especial value. It would be practically impossible to determine this fact, however, in most cases.

This case I report by courtesy of Drs. G. E. Tyler and Leonard Freeman, with whom I saw it at the Arapahoe County Hospital.

Case I.—D , miner, thirty-six years of age, was admitted August 16, 1900. He had syphilis at eighteen, later an attack of typhoid, with pneumonia, and, eight years ago, acute articular rheumatism of several weeks' duration. He had done hard manual labor all his life.

For seven months he had had pain in the right side of the neck. Four months ago a tumor appeared, and one month later his voice failed. There has been of late slight difficulty in swallowing. Pain is at times severe in the suboccipital and mid-scapular regions.

He was a well-developed laboring man, with healthy general appearance. A pulsating tumor existed in the base of the neck upon the right side, easily visible across the ward. It rose behind, and dislocated the right sternoclavicular joint, and was of the size and shape of a goose-egg.

The dulness around the base extended to the second interspace and the left edge of the sternum and slightly beyond the right edge of this bone.

Tracheal tugging and diastolic shock were present, although no diastolic shock was perceptible over the tumor. The right pupil was smaller than the left, and the right vocal cord was paralyzed. The pulse was from 84 to 100, temperature normal, urine negative.

After three weeks' rest in bed, on September 6th, 250 c.c. of 1 per cent. gelatin salt solution were injected, and on the 8th the same amount of 2 per cent. solution. Much after-pain resulted, and this treatment was abandoned. On September 17th, no improvement having been noted, and the patient rapidly getting worse, orthopnœa having developed, Dr. Freeman tied the right carotid and subclavian arteries under local anæsthesia by Schleich's solution, without material pain or shock, immediate union resulting. On September 21st, 23d, and 24th the 2 per cent. gelatin was injected as before.

On September 28th, no material improvement having resulted, the patient being worse off than before in many respects, and the skin over the aneurism being much reddened, 5 or 6 feet of No. 27 silver wire were introduced through a trocar by Dr. Freeman; it was the ordinary undrawn, coiled silver wire kept in the surgical supply houses. A current of 75 milliampères was applied for thirty minutes. The gelatin solution was injected on September 29th, 30th, October 2d and 3d, as before. The needle being imperfectly insulated, the skin was burned over an area the size of a silver dime. The needle puncture did not promptly close, and oozing of serum took place for a number of days. A tumor the size of a large olive, filled with serum, projected from the general contour of the aneurism. There was also a soft spot in the aneurism which persisted for many weeks. This was presumably also filled with serum.

The patient remained in the hospital for over four months, most of the time in bed, gradually improving, although the improvement was scarcely noticeable until the disappearance of the serous tumor. The tumor has steadily diminished until to-day (April 10, 1901) none is to be found. A slight pulsation has returned, through collateral circulation, in the right radial artery. The right hand is slightly cyanotic. The right pupil is moderately contracted. The voice remains husky, but is greatly improved. No dysphagia remains. Auscultation reveals nothing abnormal in the chest, while percussion still shows a slightly increased dulness over the region just below the right sternoclavicular articulation. The patient's collar pressed upon the skin over a prominent coil of wire and caused a small ulceration, with a fistulous opening leading down to the wire. This causes no trouble at present. The patient took moderate doses of potassium iodide for a long time.

It is of the utmost interest to me, in view of my recent study of the tracheal diastolic shock, to note that this phenomenon disappeared some weeks before the tracheal tug, during the retrogression of the aneurism.

I have elsewhere stated that I believe this sign—the shock of closure of the aortic valves transmitted through a fluid tumor to the trachea and manifested by a diastolic shock felt at the cricoid cartilage immediately after the tracheal tug—to be of value in distinguishing aneurism from tumor, although several instances have been reported of tracheal tug in connection with mediastinal tumor. The disappearance of the sign as the aneurism solidifies, with the subsequent disappearance of the tracheal tugging, was thus very gratifying to me as tending to confirm my position. The patient is at work as a day laborer, handling the pick and shovel, and finds no difficulty in this work. A skiagram fails to reveal the wire, since it is hidden by the shadow of the aneurismal contents.

In the early part of July, 1901, this patient returned with a portion of wire presenting at the mouth of the sinus. There was redness, swelling, and suppuration. I easily removed the wire, which was compressed into a small bunch. In a few hours a severe hemorrhage (in the nature of a secondary hemorrhage from ulceration?) took place.

This was followed at intervals of a few days by others. The aneurism rapidly re-formed, causing compression of the trachea, with coughing of blood and very difficult respiration. Although the man was in a desperate condition, another wiring was done on July 13, 1901. About fifteen feet of soft, uncoiled wire (No. 27) were used, a current varying from 50 to 70 milliampères being turned on for thirty-five minutes. The operation was well borne, but the dyspnœa became so extreme that death resulted in sixty-two hours. Autopsy revealed a firm, satisfactory clot filling the entire aneurism, with the wire passing in and out throughout its substance in all directions. The fatal result was due to pressure on the trachea, which had not been relieved by the operation.

CASE II.—L., aged fifty-six years, hotel-keeper, was seen December 13, 1900, with Drs. Leonard Freeman and J. P. Roberts. Although he had been very active in athletic ways, his work had not been severe. He had not drank heavily, and there was no specific history. He was well developed and well preserved.

For six months he had pain in the upper chest, upon the right, shooting into the right side and arm. It was worse after exercise. Rest, and at times change of position, relieved the pain somewhat. During the past few days he has noticed a pulsating tumor over the aortic area, which led him to seek advice.

His voice and vision were normal. Upon examination we found a bulging tumor at the second right interspace, about three inches across, the skin inflamed and angry in appearance, with marked visible and palpable pulsation. This was decidedly expansile in character. The ribs were not eroded entirely through, although the tumor crowded them forward. The heart-sounds here, as elsewhere, were normal, with the exception that the aortic second sound was sharply accentuated. The heart was normal in area and position. Pulse 108, respiration normal. The pupils were equal and responded to light. The larynx showed nothing abnormal. The urine was negative. A slight tracheal tug could be detected, but no diastolic tracheal shock. The lungs were entirely negative, excepting for the dulness over the seat of the aneurism. The hand was congested and slightly cyanotic.

The patient was sent to St. Joseph's Hospital, and, with rest in bed for ten days and small doses of potassium bromide, improved notably. The redness over the tumor subsided, and the prominence and pulsation were less marked. The pain diminished in corresponding manner.

On December 24th, Dr. Freeman introduced, under local anæsthesia by Schleich's solution, 22 feet of No. 27 silver wire of the kind mentioned, through a deeply introduced trocar, slightly to the outside of the centre of the protuberance caused by the aneurism. The blood spurted in a fine stream several feet high for an instant, but only a few ounces were lost as the wire was inserted. A current of 70 milliampères was applied for sixty-five minutes. Upon the first application the pulse slowed from 90 to 52, and the patient felt very faint, but he recovered immediately upon stopping it, and by raising it gradually to this point no further trouble ensued. The vagus had probably been too much stimulated. A hypodermic injection of strychnine was given at the time.

The bleeding ceased upon the application of the current. No effort was made to check the slight loss of blood at the beginning, as it was thought that clotting would be promoted by the lowering of the blood-pressure.

At the close of the operation the pulsation was notably less than at the beginning. No change in the auscultatory signs could be detected. Following the operation, rest in bed, subcutaneous injections of 2 per cent. gelatin solution, and small doses of potassium iodide were employed. Following the second operation the gelatin was given by enema daily. No very apparent results could be noted from these measures, however.

The tumor was decidedly reduced in size during the few weeks following the operation, and the patient's pain entirely disappeared. The expansile pulsation was no longer noted, although the aneurismal mass was lifted upward by the underlying aorta.

By February 20th it was evident that pulsation was increasing at the right edge of the tumor. Slight dilatation of the right pupil was noted, and an exceedingly soft systolic murmur was heard over the aneurismal area. Dr. Freeman therefore introduced, in the same manner as before, 8 feet of wire, and the current was applied for seventy-seven minutes at 70 milliampères and for fifteen minutes at 50 milliampères, with a short interruption because of irregular working of the battery.

The patient stood the operation well, and at its close the pulsation of the aneurism had practically ceased excepting at the extreme right.

By March 13th it was evident that some pulsation was to be found, but the canula withdrew only serum. Three feet of wire were introduced with difficulty, and the current at 75 milliampères applied for seventy minutes. On April 29th the tumor still pulsated at the right border, and a deeply introduced canula brought blood at a depth of one and a half inches. No pulsation was to be noted in the flow, however, thus indicating that the blood existed in a quiescent pool in the centre of a thick coagulum. On the next day Dr. Freeman inserted 6 feet of wire without the difficulty which had led him to desist in the last attempt, and applied the battery at 75 milliampères for seventy-two minutes. After the first half-hour the pulsation communicated to the needle ceased. The patient was entirely comfortable after removal to his room.

Auscultation on May 1st showed the respiratory murmur to be normal throughout the chest. The soft systolic murmur persists over the tumor, with the moderate aortic accentuation. Heart otherwise negative. Radial pulses equal and synchronous. The tumor still lifts slightly with each heart-beat, but does not expand.[1]

The last-quoted case, although not yet complete, demonstrates conclusively to me that we should follow up the treatment as may be necessary. If an aneurism be of large size, only a portion of it may be solidified at the first attempt, and bulging may occur elsewhere, as in this case. This should be met by renewed introduction of the wire and electrolysis. I venture the assertion that more aneurisms will be cured in the future by repeated attempts than at the first trial.

I have not seen sufficient benefit from the injection of gelatin solution under the skin or per rectum to lead me to place confidence in it; still, being a safe measure, with some possibility of good, I think it may be properly used. If there were any way of becoming assured that the sac were cut off by fibrin or otherwise from communication with the aorta, I would introduce the solution into the aneurism. It is probably too hazardous a procedure as our knowledge of such matters now stands.

I do not think we have sufficient evidence upon which to base conclusions as to the size of the opening from the aorta, the chances of obtaining complete solidification, or the danger in operating. Patients really incur a considerable risk in any operative procedure, but an entirely justifiable one in view of the bad prognosis of the disease under medical treatment.

Although certain reporters have stated that great aid was obtained by means of the fluoroscope and radiograph in deciding as to the size, shape, and location of the aneurism, so little was gained in repeated attempts with our first patient that none was made with the second.

So much uncertainty must necessarily always exist regarding the shape, size, and parietal condition of an aneurism that uniformly good results must be impossible. The favorable outcome in some cases, however, is sufficient to encourage us to continue along this line.

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[1] October 16, 1901. This patient continues in good health, and manages his hotel as formerly.

A CASE OF SYPHILITIC INSANITY AND ONE OF PARALYTIC DEMENTIA SIMULATING SYPHILITIC INSANITY;

WITH POST-MORTEM FINDINGS AND REMARKS ON THE DIFFERENTIAL DIAGNOSIS OF THE TWO DISEASES.[1]

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According to Fournier, about 21 per cent. of cases with tertiary syphilitic diseases show brain symptoms of syphilitic origin. Hielman states that of those infected with lues, from 1½ to 2½ per cent. get brain syphilis; he does not include general paresis and tabes in this estimate. Of these perhaps a quarter recover, another fourth improve decidedly; at least half die or only survive with grave disease.[2]

Not all cases of cerebral syphilis present mental symptoms; neither do all cases of insanity presenting a distinct history of syphilitic infection show characteristic mental symptoms or the somatic signs which are common manifestations of the syphilitic toxin. Syphilis may be an etiological factor in the production of any form of insanity through toxæmia or exhaustion of the higher psychical centres, from worry or anxiety, these factors having a modifying influence on the character of the mental symptoms. Why one case of cerebral syphilis should present psychical symptoms and another be free from such complication is best accounted for by the greater vulnerability or "susceptibility of the tissues of the person to disease in general, the one previously constitutionally sound, resisting to the utmost tissue degradation, the other, with inherited tendencies to cell decay, falling a ready victim to the toxin."[3] Exhaustion due to mental stress of any kind, venereal excesses, depressing effects of injury, and intoxications and infections become determining factors in the production of syphilitic insanity, here, in the words of Mickle, playing a more important part than the frequent one of bringing on the sudden outbreak of an already existing but slumbering brain affection.

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[1] Paper presented by Dr. Diller before the meeting of the American Neurological Association, held in Boston. 1901.

[2] W. Julius Mickle, M.D., "On Syphilis of the Nervous System," Brain, 1895.

[3] Berkley, Mental Diseases, p. 212.

The psychical symptoms, whether of simple intellectual enfeeblement, mental excitation, delirium, sudden furibund mania, stuporous states, and, more rarely, acute melancholia or persecutory monomania, may at first be free from any association or combination with other cerebral affections of specific origin, such as sudden faints, headache, convulsion, aphonia, facial paralysis, optic neuritis, hemiplegia, or monoplegia. These cases, fortunately rare, present great difficulties in diagnosis, and must frequently be overlooked, the one hope—*i. e.*, early institution of appropriate treatment—thus being lost to the patient. Of some significance, however, are tendencies to remission and to relapse which characterize the psychical as they do the somatic signs of the disease, which phenomena are explained by the underlying pathology. Whether they be of the hypochondriacal, delirious, melancholic, or maniacal type, or various combinations of these, they tend to pass into dementia, with the predominance of negative intellectual symptoms, often associated with failure, weakness or loss of attention, will, memory, with deterioration in moral sense, ideas of propriety, and a general mental degradation.[1]

In the majority of cases, however, the association and commingling of somatic signs characteristic of the luetic process, with psychical symptoms varying with individual cases, reveal the specific nature of the phenomena. Appreciation of the significance of these important criteria is essential if the patient is to have the chance of recovery only afforded by early diagnosis, with the institution of energetic specific treatment. The following case is given in some detail because it illustrates many of the more important diagnostic point by which syphilitic insanity may be recognized:

A. P., an oil driller, aged thirty-five years, was admitted to Dixmont Hospital on December 6, 1900, at which time but a meagre history was obtainable. A sister, who subsequently visited him, gave the following history:

Family History. His father suffered all his life with rheumatism; his fingers were deformed and shoulder crippled. Throughout life he was eccentric, had an uncontrollable temper, and periodically behaved as though quite out of his mind. He died of pneumonia at the age of seventy-nine years. His mother is living, aged seventy-six years. She is considered by strangers to have been queer all her life, and her daughter states that, in her opinion, she is insane at the present time. Two maternal uncles were insane, one being defective from boyhood; in the other insanity developed later in life. Of two brothers, the elder, always defective, was early sent to an institution for the feeble-minded; later he was an inmate of the State Asylum at Harrisburg, and, at the age of seventeen years, of the Western Pennsylvania Hospital at Dixmont. He now makes his home with relatives—a dull, feeble-minded old man, although only fifty-six years of age, barely able to look after his personal needs. The second brother, aged fifty years, though peculiar from childhood, was of average intelligence and acquired a good education, becoming an artist of fair ability; at least the sale of his paintings brought him a living. Never well-balanced, he would change from one occupation to another, giving up remunerative positions without adequate cause. Dissipated since early youth, he now has locomotor ataxia. He is far from normal mentally, although able to earn enough to pay his board among strangers. A sister, aged thirty-eight years, presents no psychical abnormality, but is markedly neurasthenic.

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[1] Fournier, quoted by Mickle.

Personal History. The patient had measles at two years of age, which left him with a chronic diarrhœa lasting a year or more. A few years later the left side of the head and face was affected with a skin disease which his doctor termed "scrofula;" this lasted many months. Up to the age of sixteen years he was subject to violent attacks of intestinal colic. He was always considered a bright and clever boy, with mental attainments quite up to the average (common-school education), but early inclined to all kinds of excesses. He has used large quantities of tobacco and whiskey freely and continuously since he was eighteen years of age, but, like most of his brothers, was profoundly influenced by a small quantity. At twenty-two years of age he married a woman beneath him in social position; living unhappily, he was absent from home for longer or shorter periods, and a consecutive history cannot be obtained. It is known, however, that four years ago he contracted syphilis—a primary sore being followed by sore-throat, alopecia, and skin eruption—for which he has since been continuously under treatment. Although working hard at his occupation of drilling oil wells, he was never compelled to lose a day until an accident occurred which befell him in August, 1899, when several of his ribs were fractured in being struck a glancing blow by a falling clamp which weighed 1000 pounds. Before he completely recovered from the results of this accident he resumed work in a place where malaria was prevalent (epidemic), acquiring the disease, from which he suffered continuously for three months. Now, unable to work, he made his home with his sister, who noticed that he occasionally appeared as though dazed, worrying much about his condition, and at one time he talked of suicide. He complained of constant and intense pain in his head. (It cannot be determined that this was markedly worse at night.) In January, 1900 (three years after he acquired syphilis and eleven months before his admission to the hospital), he became irritable and suspicious, complaining that his mother and sister treated him badly, were not like they used to be, and blamed them for all his misfortunes. About this time he had some trouble with his eyes, of which only a vague description is furnished; but it is known that the left eye was so seriously involved as to lead him to consult a physician. Despite all treatment, vision in this eye grew progressively worse. Leaving the home of his sister, he now returned to his wife, with whom he lived until two months previous to his admission to the hospital. All that can be learned about him during this period is that, although able to work at his trade from time to time, he began to grow dull and stupid and had occasional violent outbursts of temper, in one of which he murderously attacked his wife with a poker. In July he had two fainting spells, in which he was seen to stagger before falling in total unconsciousness. About this time the patient complained of hearing queer noises, which he located "within his head;" occasionally these were so distinct that he would go to the door of his shop, thinking he heard bands of music. Shortly afterward he was confined to his bed by an attack of "fever, with delirium," during which he saw objects on the wall and talked wildly about "imaginings, which all seemed to be of the horrible order." In this attack stupor alternated with delirium for nine to ten days, when the patient seemed suddenly to grow better, recognizing his surroundings, though slightly confused for several days. One week later he was able to return to work; soon afterward he had a second attack, which was more severe, but recovery took place as in the preceding one. Three weeks later another attack occurred, since which time he has never seemed like his former self. From October 1st to November 20th he again made his home with his sister, who states that he had some trouble with his left arm (lower extremity not involved), and could not use it for several days; but it rapidly cleared up, leaving no trace after the lapse of a couple of weeks. During this time, when not in a dull and stupid condition, he was irritable or sullen.

Examination by Dr. Walker, upon admission, shows him to possess a fairly well-developed musculature and to be well nourished. His skin is healthy, but old scars are seen over the left temporal and right anterior tibial region. There is extreme pallor of the surface of the body. The heart-beat is very feeble; no abnormal sounds. The pulse is 92; irregular. There is no abnormality of the respiratory organs. The tongue is clean, and the digestive functions, apparently, are well performed. Urine: Specific gravity 1024; shows a faint trace of albumin. Microscopical examination was not made. There is no paralysis. The patient is dull and listless; he answers questions in monosyllables, without appreciation of their import. The tendon reflexes are all exaggerated, more markedly upon the left side; no ankle clonus. Superficial reflexes are present and normal. External examination of the eyes reveals nothing abnormal. Pupils: Right, 3 x 3 mm.; left, 3½ x 3½ mm.; margins are regular; irides react promptly to light and accommodation. Ophthalmoscopical examination is made with difficulty, but repeated attempts reveal in the right eye no gross abnormality; in the left, however, is seen deep, atrophic excavation of the disk, presenting the bluish-white appearance of neuritic atrophy.

December 11th (five days after admission). The patient has been dull and confused since admission; to-day he is more restless, muttering in low delirium, and is with difficulty kept in bed.

16th. Confusion and delirium are increasing, with active motor agitation. This morning at 2 o'clock the nurse noted that respiration was very shallow (7 to the minute) and the radial pulse was scarcely perceptible. He revived under strychnine and atropine, given hypodermically. He remained in a stuporous condition for eight to ten hours, from which he could not be aroused to note anything understandingly, followed by active delirium, with sense deceptions of a horrifying character. Marked speech defect is now manifested in stammering and lisping, and the lips are puffed out with each expiration. There is also difficulty in swallowing, attempts to do so bringing on choking spells.

20th. Delirium of varying degree of intensity continued until this morning, when he fell into a sleep of four hours' duration, from which he awakened with inquiry as to his whereabouts. He recognized his sister, who was present, for the first time; and for a period of seven or eight hours he was conscious of his surroundings to the extent of making his wants known. He then relapsed into a semi-stuporous condition, (urine and feces passed under him), from which, for a time, it was impossible to arouse him to give nourishment and medicine.

23d. The stupor deepened into coma, and ended in death, which occurred to-day, seventeen days after admission.

Prominent in the history of this case are the marked hereditary brain instability, further increased by the patient's habits; prolonged exposure of vulnerable tissue to the poisons of tobacco and alcohol, followed by those of the toxins of syphilis, and, later, malaria, with the further depression of the vital forces by traumatism. That the brain disease was hastened in its evolution through the cerebral congestions caused by malaria seems probable. At all events, under the contributive influences of these various factors we see developing in this patient headache, optic neuritis, sudden faints with vertigo, transient and incomplete monoplegia, bulbar symptoms, with the psychical manifestations of mental apathy, depression, irritability, suspicions, violent outbursts of temper, hallucinations, stuporous delirium, and rapidly advancing dementia, this combination of psychic with somatic symptoms presenting the condition to which the name of syphilitic insanity is given.

The autopsy was performed four hours after death by Drs. Walker and Burns. The brain only was examined.

No peculiarity was noted about the skull; the dura mater, however, was somewhat adherent upon the right side. The brain itself, as well as the pia mater covering it, presented a healthy appearance; in short, no pathological changes whatever were visible to the naked eye, save that the convolutional arrangements in several particulars were somewhat atypical. The microscopical examination was made by Drs. Burns and Diller.

Several pieces of the cortex were excised, placed in alcohol, and subsequently stained by the Nissl method. Portions of the cortex, the entire brain stem, and the upper segments of the cord were preserved in Müller's fluid. Sections of them were subsequently made and stained by the Weigert, Pal, and Van Gieson methods; and subsequently, at the suggestion of Dr. W. G. Spiller, other sections were stained with Delafield's hæmatoxylin.

The sections stained by the Nissl method showed the cells of the cortex to be normal in the main, although here and there a slight granular degeneration of the cytoplasm or a dislocated nucleus was noted. The vessels were best seen in the sections stained with Delafield's hæmatoxylin. The vascular changes were particularly studied as occurring in the pia mater, the cerebral peduncles, the interpeduncular space, and the oblongata. While a large number of vessels were seen exhibiting little or no change, the majority of the vessels showed more or less change. This change, for the most part, consisted in the proliferation of small round-cells from the adventitia into the perivascular lymph channel, partly or wholly obliterating that passage-way. (See Fig. 4.) In others the proliferation, however, was in both the middle and external coats of the vessel. (See Fig. 3.) In a less number of cases there was proliferation into the lumen of the vessel, which was only rarely found to be entirely obliterated by the proliferation (see Fig. 2), while in a still less number of instances the infiltration occluded both the lumen and the perivascular lymph space and obscured the

FIG. 1. FIG. 2.

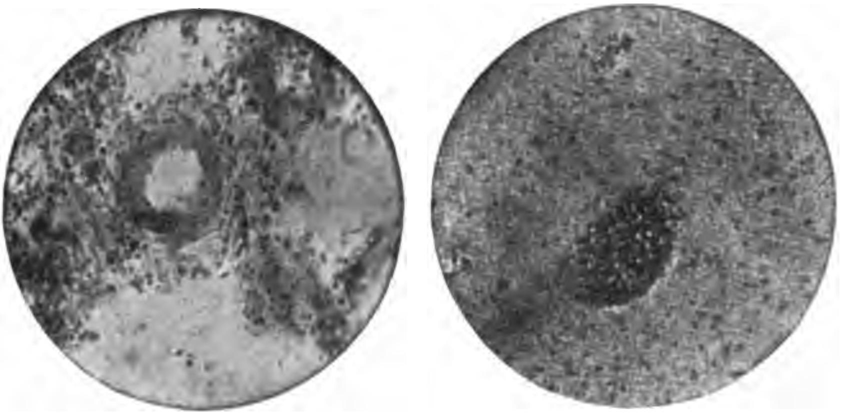

Fig. 1.—The infiltration involves the adventitia and perivascular lymph space, springing apparently almost wholly from the former.

Fig. 2.—The infiltration here is into the lumen, occluding the same, and due to proliferation from the intima.

FIG. 3. FIG. 4.

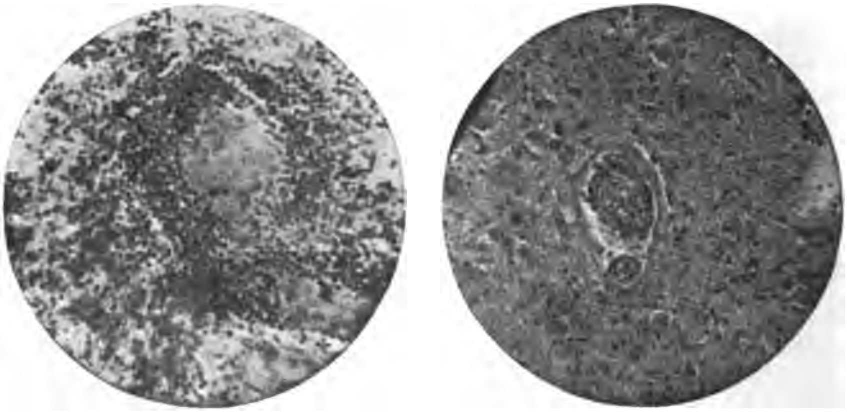

Fig. 3.—An enormous mass of round-cells is seen involving all three coats of the vessel and filling the perivascular lymph space, and extending far beyond its limits. The lumen of the vessel, closely packed with blood-cells, is but little occluded by the infiltrate. Here it seems probable that the adventitia was the starting-point of the proliferation.

Fig. 4.—The infiltration here involves all three coats of the vessel and occludes completely both its lumen and that of the perivascular lymph space as well, being pretty well limited within the boundaries of the latter.

entire wall of the vessel. (See Fig. 4.) In a few instances the lumina of the vessels were greatly narrowed by an overgrowth of the media rather than by round-cell infiltration.

The facts that the nuclear proliferation was seen most frequently involving the adventitia, that the media was next most frequently involved, and that proliferation from the intima into the lumen alone was seldom seen, lends support to the view expressed by Berkley,[1] that the source of the proliferation is chiefly, or most frequently if not always, from the outermost coat of the artery, as against the views of Heubner and other earlier writers. Indeed, our sections correspond closely to those shown in Figs. 1, 2, and 3, Plate 4, in Berkley's text-book.[2]

Thus it will be seen that through the changes emanating from the vessel walls the flow of lymph in the perivascular channels must have been greatly interfered with, and that this was probably a much more powerful factor in the production of the symptoms observed than the narrowing or occlusion of the lumina of the vessels.

The second case which we shall report is one which came under the observation of one of us (Dr. Diller) at the Allegheny General Hospital. It is introduced in this connection because it was also diagnosed as a case of syphilitic insanity, whereas the autopsy demonstrated it to be one of paralytic dementia. It will illustrate the great difficulty, at times, of making a differential diagnosis between these two affections.

W. M. H., aged thirty-three years, white, male; married; a machinist, but he had also been a sailor for several years.

Family History. Entirely negative.

Previous History. He had always been in excellent health previous to February, 1900, with the exception of a varicocele, which he has had for twelve years, and which he says followed an injury received while a sailor. It caused him a great deal of trouble, which was, however, mental rather than physical. He has always been a hard worker. No history of syphilis was obtainable.

History of Present Condition. On February 17, 1900, while in his usual health, he had an attack in which the left side of the body became numb, with absolute loss of power on the same side. There was no loss of consciousness, and the patient recovered completely in from five to seven minutes. He had a similar attack two weeks later. In April two more attacks occurred, and another in July. Following the attacks in April his wife noticed impairment of memory. This was the first mental symptom observed.

On the morning of October 8, 1900, while crossing the room, he fell to the floor unconscious, and was completely paralyzed on the left side. He remained in this condition all day. During the following night, about twelve hours later, he had three general convulsions, lasting in all about half an hour. On the following day, October 9th, the paralysis was less marked, but he could, however, be aroused. On October 10th he had many delusions, and was thought to be temporarily insane. Three days later, on account of these mental symptoms, he was taken to St. Francis' Hospital, where he remained three weeks, and was then discharged as cured. From this time until his admission to the Allegheny General Hospital, on December 10, 1900, he seemed to be "childish," and had a good deal of difficulty in utterance. In health he had always been a fast talker, but following these attacks he spoke very slowly. He had no headache or vertigo, and never vomited. His eyesight was good.

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[1] Mental Diseases, pp. 90, 91.

[2] Op. cit.

He came to the Allegheny General Hospital on December 10, 1900, for an operation for varicocele. His mind was constantly fixed on this condition, and it was thought that perhaps an operation would help him. The operation was performed the following day by Dr. R. L. McGrew, and the patient made a good recovery. On December 20th he was about to leave the hospital, when he was suddenly seized with a severe general convulsion, lasting about fifteen minutes. He had a second one that night, and a third the following morning (December 21st). These attacks left him in a condition of hebetude, with delirium. There was paralysis of his entire left side, with partial paralysis of the muscles of speech. His eyes were turned constantly to the right, but he could move them to the left. The pupils were widely dilated, the left more than the right. The left pupil reacted moderately to light, the right scarcely at all. Knee-jerks: Normal on the right, exaggerated on the left. Ankle clonus is marked on the left, absent on the right side. Babinski sign is absent.

December 23d. Paralysis of the left arm is almost complete; paralysis of the leg is much less complete. No change in the knee-jerks. Ankle clonus is not present. The mental condition is difficult to determine exactly, but seems to be one of dementia, with stupor. Speech is paralytic.

26th. Mental condition is much improved. Left arm and leg are much stronger. Conjugate deviation has entirely disappeared.

27th. The eye-grounds were examined by Dr. Duncan and found to be normal.

31st. He moves the left side very well to-day. Pupils are equal and react well to light. The patient was discharged immensely improved in every way. For a few days after his discharge from the hospital he was able to go about, and seemed pretty well, but there was an evident dementia, and the speech strongly suggested paralytic dementia. He was seized with another convulsion at home, with left-sided paralysis, also with delirium and stupor. On January 10, 1901, he was taken to "Claremont." He improved very rapidly for several days, when he had another severe convulsion, followed by left-sided paralysis and great mental confusion. This partially cleared up, and he continued to improve for several weeks, until March 9th, when death occurred, following a very severe convulsion.

The autopsy was performed twelve hours after death by Dr. Charles E. Ziegler, of the Allegheny General Hospital, and Dr. Diller, at the City Poor Farm at Claremont, the brain and upper portion of the cord alone being removed.

The calvarium was very thick, and the dura itself much thickened, was strongly adherent to it. The pia was watery, œdematous, and of a milky-white opacity over the parietal and frontal lobes, while that over the occipital and temporal lobes, as well as that over the base, presented a comparatively healthy appearance. There was a subpial hemorrhage at the top of the Rolandic region on the right side, another a half-inch anteriorly, and a third the same distance behind. There were also subpial hemorrhages at the anterior extremities of both frontal lobes. The vessels were large and tortuous over the frontal and parietal lobes. The convolutions could not be made out because of the opacity of the pia. The pia was stripped off with difficulty, small portions of the cortex adhering to it, leaving a roughened appearance of the cortex behind. In short, the naked-eye picture was typically that of paralytic dementia.

Small pieces of the cortex were placed in alcohol, and sections from these were afterward stained by the Nissl method, while the brain stem and pieces of the cortex were placed in Müller's fluid for preparation by the Van Gieson, Weigert and Pal methods. The microscopical examinations were made by Drs. Burns and Diller.

There was greatly increased vascularity everywhere throughout the cortex. There was a large amount of cellular exudate in the lymph spaces. The vessels were, as a rule, dilated, frequently to several times their normal size.

The great majority of the cortical cells showed no changes, but in a large number various morbid changes were seen. A number of cells were seen showing granular degeneration of the cytoplasm, most of which contained a healthy nucleus; but in some of them the nucleus was indistinct or irregular in outline, while in still others it had wholly disappeared, leaving only a mass of granular detritus behind it. In a few cases only faint skeleton outlines of the cell were to be observed, in some of which the nucleus could still be seen. In many cells a granular degeneration had involved one portion only of the cytoplasm. In a few cases the nucleus was shrunken and irregular in outline. A dislocation of the nucleus was observed frequently both in degenerated cells and in cells which otherwise appeared normal. The nucleus was found at the side of the cell most frequently, sometimes protruding beyond the side. In certain areas of the cortex there was great scarcity of cells, and it seemed that here cells had probably disappeared entirely.

Thus it will be seen that changes characteristic of paralytic dementia were discovered both by the naked eye and the microscope. That the case was one of this disease we do not doubt.

The clinical recital of the case will alone be enough to suggest the difficulties of diagnosis. Indeed, the case so strongly suggested syphilitic insanity that it is difficult to see how a correct diagnosis, at least in the earlier development, could have been made from the symptoms. The recurrent attacks of hemiplegia, convulsions, mental confusion, stupor, maniacal excitement, with the rapid recovery, in a thirty-five-year-old-man, seemed to point to syphilis as the cause of the symptoms, in spite of the fact that dementia and paralytic speech were present.

When the man was first seen by Dr. Diller, however, in reply to the question, " How are you?" the answer, "V-e-r-y w-e-l-l," was made in the way so highly characteristic of paralytic dementia that the thought at once arose that the patient was a case of this disease. After leaving the Allegheny General Hospital, when he had very largely recovered, a moderate dementia and this same characteristic speech were both noted, and the suspicion still lurked, although the evidence seemed greatly in favor of the diagnosis of cerebral syphilis. With the subsequent history as it now stands, however, it must be admitted that the correct diagnosis might be made.

For the excellent photomicrographs which illustrate this paper we are indebted to Dr. A. Letèvé, of the Magee Pathological Institute of the Mercy Hospital.

A CASE OF MYXŒDEMA, WITH A STUDY OF THE BLOOD AND URINE DURING TREATMENT.

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The following study of a case of myxœdema may not be uninteresting in connection with the views respecting the exact function of the thyroid gland. The broad symptomatology, indicating as it does a disturbed condition of the various organs of the body, tends to some confusion in the interpretation of functions. Many of the symptoms of myxœdema are merely secondary, and many of the so-called functions of the thyroid gland are very secondary in character. That the chief function of the thyroid gland, however, has to do with the matter of the destruction or elimination of some substances which are prejudicial to the body, and which, if retained, produce various symptoms of an intoxication of peculiar type, with an ultimately fatal result if untreated, is accepted by most clinicians, and this view is amply supported by clinical and experimental facts.

On the morning of May 22, 1900, I was called to see Mrs. F., aged forty-three years, married, mother of seven children. Present illness dates from about fifteen years ago, when she began rapidly to gain flesh, having previously weighed about 110 pounds. Periods of occasional fainting, with marked irritability of temper, characterized her condition up to about five years ago. The gain in flesh continued without intermission, and during the winter of 1895 and subsequently she suffered intensely from the cold. At about the same time the skin began to show unusual dryness and marked thickening in some portions, especially the scalp, with areas of yellowish discoloration, and the hair lost its soft texture, became dry and brittle, and began to fall out. The increase in flesh continued; the abdomen became pendulous, and the limbs puffed with a solid œdema, which tended to become more marked toward evening. Some puffiness about the eyes was also present, and a certain amount of deafness was noticed by members of the family. Patient was exceedingly irritable and was easily angered. On slight provocation passed into periods of unconsciousness. These were occasionally preceded by a period of motor excitement characterized by acts of violence. Latterly these acts of violence have been more infrequent.

At the present time she complains especially of inability to concentrate her attention or to accomplish anything. Little difficulties appear insurmountable, and the ordinary requirements of living, such as bathing, dressing, walking, and riding, require great effort. Walking is done with some difficulty. In fact, for some time patient has confined her walking to the house, and experiences great difficulty in getting up and down stairs. Before the last child was born, about sixteen months ago, there was great swelling of the limbs and general discomfort, but the labor was uncomplicated and uneventful. For the past five years, but more especially during the past two years, she has suffered from a severe type of metrorrhagia. Some giddiness and pain in the head are experienced when standing erect, and latterly she has been rising late in the morning and taking but little physical exercise during the day. At present she is unable to do anything requiring effort, takes little interest in her family, household, and social affairs, and dreads and avoids all physical exertion. It is with great difficulty that she manages to take a carriage ride daily.

Examination showed a peculiar solid œdema over the whole body, especially marked in the extremities; skin very dry, thick, and scaly, and of yellowish cast; scalp thick, dry, and very scaly; hair dry and very thin; eyebrows thin. There were marked pockets beneath the eyes and some puffiness of the upper eyelids. The nails were thick and brittle; voice heavy and husky; hearing very poor; sight poor; many small warts about the neck and hands; marked fulness in both supraclavicular regions, and the thyroid gland appeared atrophied. Heart very slow and a little irregular; sounds weak and greatly muffled, no murmur; abdomen large and pendulous; bowels constipated; appetite poor; gait very unsteady and tottering. Mentally she evinces a poor memory, especially as regards recent events, and is very dull and apathetic, indifferent and markedly suspicious. Temperature 98.6° F.; pulse 57; weight 201 pounds. Patient wears spectacles, but states that they are no help to her, notwithstanding the fact that they have recently been fitted.

Urinalysis showed the presence of albumose and a trace of serum albumin. Urine pale, specific gravity 1007. The sediment presented an occasional cylindroid and many epithelial cells. Urea excreted in twenty-four hours, 16 grammes. The blood examination showed red blood-cells 4,293,000, and white blood-cells 7200 per c.mm.

On May 23d and 24th patient took three grains of desiccated thyroid two hours after breakfast. Another three-grain powder was added on the 25th and subsequently, so that the patient received six grains of thyroid daily. This amount was not increased for several weeks because of the effect on the heart. Until May 31st the patient continued to spend most of the time in bed, and subsequent to this date was kept in bed continuously. The pulse gradually increased in frequency until on the evening of May 31st it was 74 and fuller and stronger. Mentally she was very much better and more cheerful than for many months, and a "stuffy feeling" of which she had complained for a long time had entirely disappeared. She seemed especially elated over a return of her hearing, and repressed members of her family who continued to deem it necessary to converse in a loud tone of voice. Weight, May 31st, 185½ pounds. Blood examination was made on June 1st, with the following result: Red blood-cells, 3,520,000; white blood-cells, 4500. The urinalysis still showed a trace of albumin. The urea excreted rose on June 3d to thirty-one grammes, and on the 4th was twenty-seven grammes. Patient continued to take six grains of thyroid daily throughout the month of June, and showed marked improvement in all her symptoms. Once the thyroid was discontinued on account of a rapid and compressible pulse, ranging from 90 to 100, but these symptoms subsided in three days, and the thyroid was again resumed. The weight on June 10th had fallen to 177½ pounds, and on June 17th to 176 pounds. The skin showed marked improvement over the whole body, and she heard so well that the noises of the street were troublesome, notwithstanding the surroundings of a quiet country home. The eyesight was greatly improved, and she read without glasses. On the 12th and 13th patient suffered considerably with ovarian neuralgia, which she said resembled very closely some similar periods during her girlhood. This ceased on the 14th, and did not return. The heart-sounds, which were very weak in the beginning of the treatment, became firmer and better punctuated as it progressed. The skin of the face improved in color and texture, and the pockets beneath the eyes rapidly disappeared. The June menstrual period was normal, for the first time in many years, and latterly the bowels have moved without a cathartic and are very regular.

During the month of July the general improvement continued. Patient suffered from occasional periods of faintness after slight exertion, but for the most part remained in bed and was very comfortable. Weight on July 8th was 173 pounds, on July 15th, 171 pounds, on July 22d, 168 pounds, and on July 29th, 166 pounds. The month was eventful in that the patient suffered from functional disturbance of the liver, with diarrhœa, and neuralgic pains in various portions of the body at irregular intervals. The urine still showed a trace of albumin, but no casts, and the amount of urea ranged from 25 to 30 grammes daily while thyroid was being given. Albumose was not detected after the first urinalysis. During the periods of illness above noted the thyroid was discontinued for a brief time and the urea dropped immediately; thus on the 13th, 14th, 15th, and 16th the daily amount of urea excreted was respectively 18, 14, 24, and 20 grammes. The rise on the latter two days was probably due to the administration of certain hepatic stimulants. The action of thyroid in increasing the daily amount of urea has been noted by a number of authors. In this case it was very striking, falling regularly during its omission and rising to the normal amount during its administration. This would seem to warrant placing the thyroid substance among the direct hepatic stimulants.

The blood examinations are presented below in tabular form. The examination on May 22d was preliminary to the administration of thyroid; all the others were done during treatment.

Date	R. B. cells.	W. B. cells.	Lymphocytes.	Large mononuclear leucocytes.	Neutrophiles.	Eosinophiles.
May 22. . .	4,298,000	7,200	25.6 per ct.	8.2 per ct.	63.4 per ct.	2.6 per ct.
June 4. . .	3,520,000	4,500	16.8 "	4.0 "	78.2 "	1.0 "
" 11. . .	3,872,000	5,400	28.6 "	6.4 "	64.4 "	0.6 "
July 14. . .	4,384,000	6,000	18.0 "	9.4 "	71.0 "	1.6 "
Aug. 8. . .	4,704,000	6,266	21.6 "	7.2 "	69.4 "	1.8 "

The blood examinations were all made between 11 and 12 o'clock in the morning, about four hours after the patient had eaten breakfast. In every instance 500 cells were counted in making the differential count.

There are several points of interest in the above table. The preliminary blood examination on May 22d showed 4,293,000 red blood-cells, and on June 4th, 3,520,000 red blood-cells per c.mm., a difference of 773,000. I attribute this apparent diminution in the number of red blood-cells to the increased activity in the various organs of the body. As a result, the fluid elements of the blood were greatly increased, while the corpuscular elements remained stationary. In other words, the apparent diminution in the number of the red blood-cells was due to the increase in the fluid elements of the blood consequent upon the pouring into it of fluids from the various organs which were recently awakened into activity. These facts tend to negative the view that the thyroid gland is directly a blood-forming organ. Under the conditions here presented it is hardly conceivable that the thyroid, if a direct blood-forming organ, would thus fail primarily to exhibit this property. The subsequent steady increase in the number of the red blood-cells is to be noted.

The drop in the number of white blood-cells per c.cm. at the second examination is to be attributed to the same cause, and their subsequent steady increase is to be noted.

The differential count showed nothing distinctive aside, perhaps, from the primary drop in the number of eosinophile cells and their subsequent gradual increase in number. A feature of some interest was the large size of the blood platelets. Many approached the size of a red blood-cell. They had attained to about their normal size three weeks after the beginning of thyroid administration. The hæmoglobin was found somewhat diminished at the preliminary examination, and there was considerable irregularity in the size and shape of the red blood-cells. This condition improved steadily, and at the examination on August 8th the cells were nearly normal.

The albuminuria, which was fairly well marked in the beginning, disappeared completely with the improvement in general symptoms.

The lowest weight attained was 166 pounds, and was recorded on July 29th. During the beginning of September the patient began to sit up regularly, after having spent three months in bed.

The largest amount of thyroid taken while the patient was in bed was nine grains daily, during the last two weeks of August. Notwithstanding this the patient gained some in flesh (two pounds) and evinced an excellent appetite. The hair grew rapidly, and during the first three months attained considerable length. The skin of the scalp presented a perfectly normal appearance. About the middle of September the patient began to go about, and was soon able to resume her normal place in her family. A year has now passed, during which she has been very well.

She is now taking regularly ten grains of thyroid daily. During the last winter she took as high as fifteen grains daily and suffered no ill effects. In fact, this amount seemed necessary in order to maintain a state of health. It has been my custom to reduce the daily amount of thyroid when the heart shows its effect in a rapid and compressible pulse. Under these circumstances I have found digitalin useful.

Patient's general condition is excellent at the present time. The pulse, which a year ago was weak and poor, is now strong, full, and regular.

I am of the opinion that it is a mistake to crowd the thyroid in the beginning of treatment. The heart muscle, from a long-continued absence of the thyroid secretion, is so poor and weak that it stands its primary depressing effect badly. When a little time has elapsed, and the heart has again become accustomed to the effect of the thyroid substance, it may be increased with propriety and benefit.

A FATAL CASE OF ACETANILID POISONING.

By Philip King Brown, M.D.,
INSTRUCTOR IN CLINICAL PATHOLOGY AND MEDICINE, COOPER MEDICAL COLLEGE, SAN FRANCISCO, CALIFORNIA.

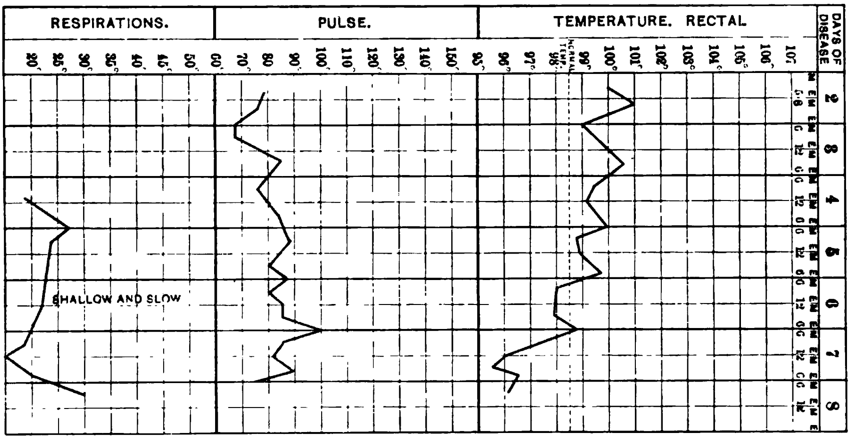
B. K., male, aged thirty-seven years, shoemaker, was brought to the Mount Zion Hospital at 5 P.M., January 22, 1897. The history of the case was as follows:

On the morning previous the patient was found by his attending physician slightly delirious and complaining very much of his head and of a pain in the left umbilical region. The temperature was much elevated, the heart rapid, and there was marked constipation, slight jaundice, nausea, and some vomiting. The day before the patient had had one chill. Calomel in small doses, followed by salts, gave a copious but bloody movement of the bowels. The urine, which was clear on the previous day, became dark red. No facts could be obtained from the family which threw any light on the case, and the patient was sent to the hospital, where I saw him an hour after his admission. It was ascertained later that a lodge physician had given him sixty grains of acetanilid in six powders for his headache, and the patient had taken them all within a few hours before his regular attending physician was called.

At the time of entrance the pulse was 78, soft, and easily compressed; the temperature was 100.2° F.; the lips and nails were extremely cyanotic, and there was slight jaundice over the whole body. The heart-sounds were normal and the action fairly strong; respirations shallow and somewhat increased; occasionally a slight, harsh cough. Lungs and spleen normal; liver somewhat enlarged, but not painful to pressure. Abdomen slightly distended in the region of the descending colon; no fecal impaction felt. Patient complained of a slight pain over the whole left side of the abdomen, and was sensitive especially in the epigastric region and over the region of the left kidney. Skin moist, tongue not coated, gums bluish, no hemorrhages into mucous membranes. The urine, 300 c.c. of which were passed shortly after entrance, was strongly alkaline and of a deep red color, nearly black. The color of the filtrate was unchanged; the sediment was small in amount, and contained granular casts, small and medium sized. The granules were fine, and ranged from golden yellow to deep brown. There were a few granular casts with epithelial cells attached. No leucin or tyrosin found. The specific gravity was 1016, and there was a large coagulum on boiling. No biliary coloring-matter. There was complete suppression of urine after the second day in the hospital. Only 150 c.c. were passed that day, and the character of it was the same as that first passed. Chemically and by subsequent spectroscopic examination the coloring-matter proved not to be hæmoglobin, but hæmatoporphyrin.

Six days later the patient died. In the meantime every effort was made to maintain the functions of all the organs. The great thirst was quenched with milk when the patient's stomach would stand it, but very soon he vomited all that was given to him and he had to be fed by the rectum. The stomach continued sensitive to pressure and to food to the end, and, in spite of the fact that nothing was given by the stomach for days, vomiting continued. The vomitus was mostly a greenish mucus. The cough and expectoration were continuous, the expectoration consisting chiefly of a clear, sago-like mucus.

Throughout the week the patient was slightly delirious and wholly indifferent to all that went on around him. The reaction of his pupils to light grew more and more sluggish, and in the end the pupils were greatly dilated. Hyperæsthesia was especially marked over the abdomen, but disappeared with continuous manipulation, to return if the patient were quiet a few minutes. The reflexes were exaggerated for the first few days, and then gradually disappeared. The exaggeration, however, occurred only at the first few elicitations at each trial.



The extremities were constantly cold, although external heat kept up the body temperature fairly well. The temperature fell slowly to normal on the fourth day, and was subnormal thereafter, reaching 95.5° F. by the rectum on the evening before death. (See chart.) The patient's restlessness steadily increased. There was alternate constipation and diarrhœa, and forty-eight hours before death and twenty-seven hours after the suppression of urine there began to be constantly blood coloring-matter and broken-down blood cells in the feces, which had until then been blood-stained only occasionally.

The heart began to fail on the fourth day in spite of increasing stimulation. The skin grew more jaundiced throughout the course of the illness, and by the third day was very dry, as were also the mucous membranes. The respirations, which were slightly increased at the time of entrance, diminished slowly to normal, although they were very shallow, the diaphragm not descending noticeably.

On the sixth day in the hospital two movements of dark red fluid were followed shortly by the passage of sheets of mucous membrane several square inches in size, and two large clots of blood, together about the size of a placenta and stained yellowish-brown on the exposed surface. The distention and sensitiveness in the left inguinal region disappeared after this, but the patient was greatly prostrated and seemed to have some pain all over the abdomen. The thighs were constantly flexed on the abdomen, and the expression of the face grew more anxious. The patient sank rapidly after this, and died eight hours later.

FIG. 1.

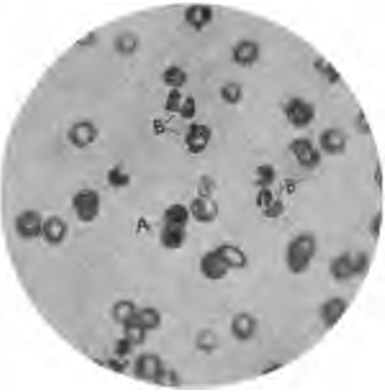


FIG. 2.

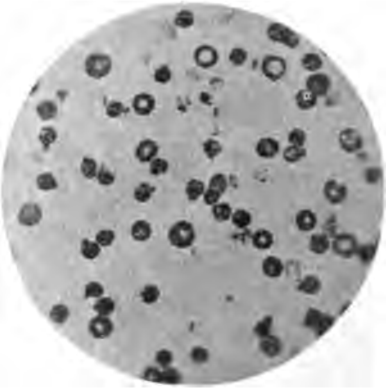


Fig. 1.—Anæmia from blood destruction. A. Red corpuscle in mitosis. B, B. Polynuclear leucocytes.

Fig. 2.—Anæmia from blood destruction, showing direct action of the poison on the red corpuscles.

The superficial circulation was so poor from the start that no attempt at hypodermic medication was tried after the first day. Salt solution per rectum was well retained at first, and was to have been tried intravenously on the day the patient died. Oxygen was not used.

Blood examinations were made on four days, with the following results:

On the fourth day of illness, the second day in the hospital, stained cover-slip preparations showed a destructive process to the red cells and a great increase in nucleated elements, most marked in the nucleated red cells. (Fig. 1.)

The following are the blood-counts and hæmoglobin estimates:

	Hæmoglobin.[1]	*Erythrocytes.*	*Leucocytes.*	*Nucleated red cells.*
5th day of illness,	40 per cent.	2,200,000	62,400	17,600
6th " "	35 "	1,490,000	62,935	25,705
7th " "	33 "	1,400,000	51,400	19,600
8th " "	32 "	1,166,000	66,450	22,150

[1] By von Kalden's method.

DIFFERENTIAL COUNTS.

	Nucleated red cells. (Seen during a count of 500 leucocytes.)			Leucocytes.			
	Megaloblasts.	Normoblasts.	Microblasts.	Polymorphonuclear.	Large lymphocytes.	Small lymphocytes.	Eosinophiles.
5th day	39	60	1	70 per ct.	26 per ct.	4 per ct.	0
6th day	15	73	12	59 "	30 "	9 "	2
7th day	...	...	...	...	...	...	...
8th day	19	65	16	57 "	35.6 "	6.5 "	0

Among the large lymphocytes I have included a considerable percentage of myelocytes.

The relation of the nucleated red cells to white cells increased from a proportion of 1 to 5 on the fifth day to 1 to 3 on the eighth day, and it seemed from the active karyolysis and karyokinesis of the nucleated red cells that every effort was being made by nature to increase the number of red corpuscles.

The specimen of the fifth day (see Fig. 2) shows the direct action of the poison on the red cells. They are of all sizes and shapes, the microcytes showing an unusual sort of distortion, unlike crenation or the changes in microcytes of pernicious anæmia, and the megalocytes having no distortion and resembling strikingly those of pernicious anæmia. Indeed, as the process advanced the picture of the red cells grew more and more like pernicious anæmia. The average diameter of the cells increased, the microcytes grew fewer in number and showed less poikilocytosis, if the distortion could be called that, and the color index increased from about one to considerably above it.[1]

That the poison acted directly on the cell membranes as well as the protoplasm is indicated by the large number of free nuclei of both the red and white cells, those of the red cells being of all sizes.

CONCLUSIONS. The patient's life was sustained eight days after taking sixty grains of acetanilid. There was a general hyperæsthesia and not an anæsthesia, as is stated to result from a poisonous dose of acetanilid. There were increased reflex actions, and motor and sensory functions were retained practically to the end, which is also at variance with the generally accepted result. The patient retained nothing on the stomach from the first, and was fed per rectum. Vomiting occurred frequently, nevertheless. Arterial pressure was constantly low, and the pulse-rate steadily increased until just before death. The respirations were slightly increased, and varied but little until the last few hours, when they increased to 30 per minute. They were always shallow, and the diaphragm did not appear to move at all. The temperature per rectum appears to have been elevated by the toxic dose, and it fell gradually to several degrees below normal. It was 96.5° F. at the time of death, and had been 95.5° F. on the day previous. There was a progressive destruction of red blood-corpuscles down to 1,116,000, with 30 per cent hæmoglobin on the day of death. There was a very marked leucocytosis and a large number of nucleated red cells of all sizes. The alkalinity of the blood (Quinan's method) was diminished 80 per cent. There was hæmatoporphyrinuria, beginning twenty-four hours after the dose was taken, and complete suppression of urine three days before death. Acute diffuse nephritis. Hemorrhage from the intestines. Acute progressive jaundice. Whether the symptoms were aggravated by the calomel administered for constipation I have not been able to determine by animal experiment. The antagonism between antipyrin and calomel is well known, and possibly the closely allied chemical products may also share the antagonism.

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[1] Compare the results obtained by Rosenqvist in animal experiments ("Blutgiftanæmien," Helsingfors, 1900).

Autopsy, Eight Hours After Death. Inspection of opened abdomen showed liver edge sharp, and the organ lying as felt before death. Stomach, normal size. No adhesions anywhere. Bowels and bladder empty. Spleen slightly enlarged, firm, capsule slightly cloudy, trabeculæ clearly outlined, pulp firm, color brownish-red. Liver, normal shape, edge firm and sharp, whole organ hard. Lobules fairly seen, color dark yellowish-brown. Gall-bladder distended with dark greenish-black viscid bile, consistency of melted tar. Left kidney normal size, firm, red-brown color, capsule slightly adherent; no distinction on section between cortex and pyramids. Right kidney slightly larger, granular, and swollen. Heart normal size, right ventricle full of light yellowish-brown fibrin clots. Valves normal. Muscle very yellow. Papillary muscles very yellow; the appearance of fatty degeneration here was very marked. Left ventricle wall 2.8 cm. thick. In both auricles and ventricles, in addition to the large pale yellowish fibrin clots, were small dark red, friable clots the size of peas. Aorta a deep yellow color, slight beginning atheroma at right coronary and in aortic arch, one segment of valve thickened but competent. Tricuspid valve slightly thickened at insertion of chordæ. Brain negative. Lungs, small amount of clear fluid in pleural cavities. Right lung adherent to chest wall throughout entire extent. The adhesions were old, and the lung was removed only by detaching the pleural membrane from the chest wall. No crepitation, but a large amount of bloody and frothy fluid could be squeezed from cut surface on pressure. Left lung presented the same appearances; few old pleuritic adhesions along the anterior base of upper lobe; old puckered scar in apex, surrounded by small area of emphysema. Bladder empty and greatly contracted. Stomach empty; inner surface covered with thick mucus closely adherent to wall; pylorus small, 3 cm. in circumference. Intestines showed chronic catarrh. The thickened mucous membrane was covered throughout with a dark green, thick, closely adherent mucus. The wall itself was discolored, but there was no sign of recent or old hemorrhage anywhere in the intestinal tract or in the submucous or serous layers—in fact, nothing to account directly for blood coloring-matter in the stools. The glands were not enlarged in any part.

LIGATION OF THE COMMON CAROTID ARTERY FOR HEMORRHAGE FROM THE CHEEK; HEMIPLEGIA; RECURRENCE OF BLEEDING; DEATH.

By FRANCIS T. STEWART, M.D.,

OUT-PATIENT SURGEON, PENNSYLVANIA HOSPITAL; ASSOCIATE IN SURGERY, PHILADELPHIA POLYCLINIC; ASSISTANT IN SURGERY, JEFFERSON HOSPITAL.

L. R., aged thirty-nine years, laborer, was admitted to Dr. Lewis W. Steinbach's service at the Polyclinic Hospital, July 9, 1901, and the following history elicited: On July 4th, while intoxicated, he received a blow on the left cheek from a fist. July 9th he applied to a neighboring hospital because of repeated slight hemorrhages from the mouth. The same evening he entered the Polyclinic with profuse bleeding from the inside of the left cheek; this was checked with hemostatic forceps and pressure. The bleeding recurred, and ligatures were passed through the cheek around the lacerated mucous membrane, but their good effect was only temporary. Ligation of the facial artery caused a respite, but bleeding again began and pressure was applied. In the absence of Dr. Steinbach I was asked to see the patient July 12th. He was very pale, the temperature 100° F., respirations 40, and the pulse 140, small and easily obliterated. On the inside of the left cheek was a sloughing area about one and a half inches in diameter, opposite the molar teeth. No history of purpura, hæmophilia, jaundice, scurvy or rheumatism could be obtained. Since admission he has bled profusely eight times, each time filling an ordinary pus basin and saturating his mattress; during the last twelve hours bleeding has been constant.

As soon as preparations could be made the left common carotid artery was tied just below its bifurcation. There was no hemorrhage, the operation resembling a dissection on the cadaver. He was liberally stimulated with strychnine and atropine, and about one quart of salt solution introduced into his circulation.

When consciousness returned, twelve hours later, mental confusion, difficulty in talking, and slight impairment of motion in the right face, arm, and leg were noticed. The following day the temperature was 101° F., the respirations 24, the pulse 106, stronger and more full. The paralyses were less marked and the mind clearer. The improvement continued until July 14th, two days after operation, when the bleeding recurred, the patient losing six or eight ounces of blood. The pulse quickly became imperceptible, and the temperature rapidly ascended to 105° just before death.

The autopsy was made by Dr. David Riesman. Rigor mortis was slight, post mortem lividity considerable; the body very pale. The muscles were dark maroon in color. The liver was normal in size, slightly fatty, and showed no cirrhotic changes. The spleen was enlarged, pale, and soft; its weight was 28 grammes. The remaining abdominal organs were normal, excepting a few old adhesions on the right side. The right kidney weighed 200 grammes, had an easily stripping capsule, a diminished cortex, and a variegated color, yellow predominating. The left kidney weighed 120 grammes and presented a small cyst on its surface.

The heart, soft, pale, and flabby, weighed 500 grammes, and contained on either side a chicken-fat clot. The tricuspid orifice admitted three fingers, the aortic and pulmonary valves were normal.. The ventricles, especially the left, were dilated; the left wall measured 15 mm., the right 7 mm.

There were numerous adhesions in the pleural sacs, the lungs were emphysematous, and opposite the sixth intercostal space under the pleura were two lipomata the size of ox-heart cherries.

The brain showed marked softening, but no other abnormality.

No thrombus was found in the carotid artery on either side of the ligature. Baumgarten has demonstrated that in the absence of infection no thrombus results after ligation. The bifurcation was about one inch above its usual situation.

The cause of death was anæmia and fatty degeneration of the heart.

The persistent bleeding must have been due to infection, as an interval of five days elapsed between the reception of the blow and the onset of hemorrhage. In a similar case I should first excise the sloughing area and approximate the healthy edges of the resulting wound with sutures.

Of 789 ligations of the common carotid in Wyeth's table 41 per cent. died. This mortality is probably excessive at the present day, for of 47 cases treated by modern surgical principles but one perished (Reyher and Weljaminaw). Cerebral involvement is common, 20 per cent. (Warren), 26 per cent. (Zimmerman), 25 per cent. (Riese). Recurrence of bleeding sometimes occurs owing to the free anastomosis with the vessels of the opposite side.

REPORT OF A CASE OF TETANUS.

By J. Norman Henry, M.D.,
of Philadelphia.

A. C., aged nineteen years, a plumber, was admitted to the Pennsylvania Hospital on July 23d, with the following history:

Fifteen days previously, while walking about in a stable, he ran a nail into his left foot for a distance of about a quarter of an inch. The wound bled very little, but caused him considerable pain for several hours, and remained sore for three or four days. The patient applied poultices, which were followed by considerable discharge from the wound.

Four days later, while in an outdoor shed which had no floor, he stepped on a rusty nail, which ran through his shoe and punctured the skin, but did not penetrate below it. He applied poultices to this also, and the puncture soon healed, after discharging some pus.

Three days before admission, on waking, patient noticed that his jaw was quite stiff, but paid little attention to it. On the day before admission the stiffness of the jaw greatly increased, and stiffness also appeared in the neck and back, which later in the day became very painful, with a sensation of "drawing up," occurring in paroxysms every few minutes. A physician was called, who advised immediate removal to a hospital. On admission the following conditions were present:

The patient was a very muscular and robust young man, evidently suffering severe pain at intervals of about a minute. Some opisthotonus present. Skin heavily beaded with perspiration. Pupils equal and react to light and accommodation. Tongue can be fairly protruded, and jaws opened so that three-quarters of an inch space appears between the central incisors.

Temperature 99.6° F., respiration 28, pulse 100 and of good volume. Heart and lungs negative. Muscles of abdomen and back tense and firm, seemingly in state of tonic contraction. A small punctured wound, recently healed, is visible on the sole of each foot. There is no inflammatory zone surrounding them.

All reflexes are intensely exaggerated, and tapping the patellar tendon causes a clonic spasm. The urine was amber, acid; specific gravity 1019; no albumin; no sugar; a few leucocytes and epithelial cells. The scars of the wounds in the feet were immediately opened, curetted out, and then swabbed with pure carbolic acid. Three grains of carbolic acid were ordered to be given hypodermically every three hours. The following day it was noted that the paroxysms were less frequent and less severe. Continuous drenching sweating was a marked symptom. Beginning at 2 A.M. the hypodermics were increased to five grains of carbolic acid every three hours.

July 25*th*. Patient decidedly more quiet and comfortable, though the opisthotonus is more marked. Examination of the urine—dark amber, clear, acid; specific gravity 1030; thin ring of albumin; no sugar, no excess of carbolic acid; a very few hyaline and granular casts present.

26*th*. Condition practically unchanged.

27*th*. Condition becoming worse; marked opisthotonus and risus sardonicus noted; pulse not so good; excessive sweating continues. Patient is unable to void urine spontaneously, but urine is perfectly clear. Carbolic acid increased to fifty grains daily.

28*th*. Slight improvement. Now voiding urine again; amber, clear, acid; specific gravity 1028. Faint trace of albumin; no sugar; one or two finely granular casts. No red corpuscles.

29*th*. Extremely sensitive to least disturbance. Carbolic acid increased to sixty grains daily. Urine still clear and freely voided.

30*th*. Temperature, which had been between 98° and 99° F. ever since admission, began rising yesterday, and at 4.30 this A.M. was 104° F. Paroxysms now almost continuous and patient rapidly weakening. Voided urine at 8.15 A.M.; light amber and perfectly clear; acid; specific gravity 1021; thin ring of albumin; no sugar; a few casts and a few red and white corpuscles. Chemically the urine showed a slight amount of carbolic acid. Patient became unconscious shortly afterward, and died at 10 A.M., temperature reaching 108° F. before and 110° F. after death. Autopsy refused. During a period of just one week the patient received a total of 303 grains of carbolic acid hypodermically without causing any smokiness of the urine at any time.

The report of the above case is of interest as showing the great tolerance of a patient with tetanus for carbolic acid, and the futility of the treatment in this case, though begun early and persisted in for one week. The case belonged to the class of acute cases most unfavorable for treatment of any kind, and, although in this instance the treatment was begun promptly, its only effect seemed to be some lessening in the frequency and severity of the clonic spasms and possibly a slight prolongation of life.

MASTITIS COMPLICATING TYPHOID FEVER.

By Fellowes Davis, Jr., M D., H. S. Patterson, M.D., and
A. W. Hewlett, M.D.,
of New York Hospital.

Although the typhoid bacillus is recognized as the cause of many suppurative processes, mastitis of this origin is a very rare event. The authors are indebted to Dr. A. B. Ball for permission to report the following case:

Augusta A. (medical number, 5564), aged thirty-four years, janitress, was admitted to the New York Hospital on May 25, 1901, complaining of fever and weakness. She had never suffered a serious illness before.

Menses began when she was sixteen years old, and have been regular, scant, and painless. She has had two children, aged, respectively, six and three years, and one miscarriage five years before admission. Both children were nursed until they were a year old. The patient has never been troubled at any time with her breasts or nipples, and has never sustained an injury of the same.

She entered the hospital at the end of the third week of her fever, which had been without incident except for the severity of her bronchitis and the history of chills accompanied by vomiting. The latter were probably due to the administration of antipyretics.

On admission the patient's temperature was 105° F., respiration 28, and pulse 140 per minute. She was well developed and well nourished, but seemed listless. Lungs showed signs of a well-marked bronchitis. The spleen was not palpable. The abdomen showed a few typical rose spots. A positive Widal reaction was obtained on the day of admission. Ehrlich's diazo test gave a doubtful reaction. Blood cultures were made on May 27th, and again on May 31st (the twenty-third and twenty-seventh days of disease), but were negative for typhoid bacilli. Rose spots continued to appear for a week after admission, and two days later had entirely disappeared. Signs of bronchitis persisted until June 5th, the thirty-second day of the disease.

June 9th. Temperature touched normal on this the thirty-sixth day of the disease. (See chart.)

12th. Three days later the patient began to complain of pain in the left breast.

14th. The left breast is now swollen, and a hard and tender lump can be felt at its outer side The glands in the axilla are also enlarged and tender.

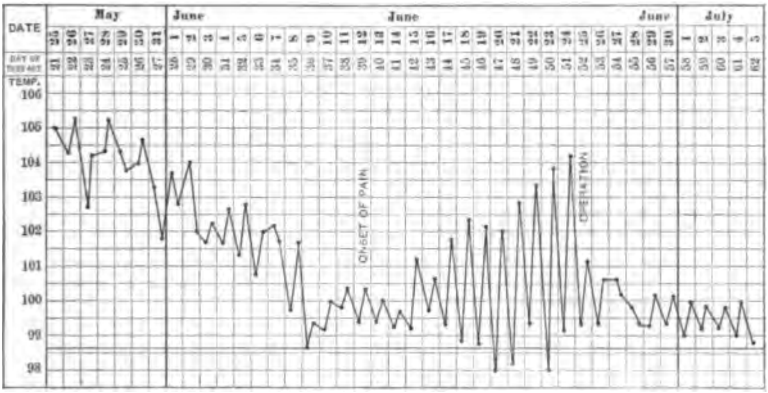
15th. The right breast also has now become tender. Lead and opium compresses were applied to both breasts, and for a time these seemed to improve. The patient, however, began to have a rise of temperature in the afternoon. (See chart.) This did not show the stepladder pattern of a relapse, but was of a septic type.

20th. The swelling and tenderness of the left breast has become much more marked, and involves the two upper and the outer lower quadrants. Skin freely movable; nipple not attached; no pus seen to exude from it after manipulation.

22d. Leucocytes, 13,200.

24th. Fluctuation was detected in the left breast. On aspiration a small amount of thick pus was obtained, from which cultures and cover-slips were made. The swelling in the right breast seems much diminished.

25th. The abscess in the left breast was opened, under chloroform, and about 150 c.c. of thick pus obtained. The abscess cavity occupied the upper and outer part of the breast, and consisted of many loculi, which were broken up with the finger.



Following the operation the temperature fell to normal, and healing was without incident. The painful lump in the right breast, which had been noticed first on June 15th, gradually diminished up to the time that the patient left the hospital, but even then a slight induration in the upper and outer quadrant could be made out. No exploratory puncture was made.

Bacteriological Examination of Pus Aspirated from Left Breast. Cover-slips show numerous pus-cells. A very few bacilli, but no cocci, were found. Cultures were made from the pus upon agar and in bouillon. The former gave a growth showing the characteristic features of the growth of the colon group upon agar. Smears showed a pure growth of a short bacillus. In twenty-four hours the bouillon showed a pure growth of feebly motile bacilli. On transplantation these gave in eight hours a growth of actively motile bacilli. This culture was tested with the blood-serum of a typhoid patient, and in a dilution of 1:10 gave a well-marked Widal reaction in ten minutes. Typhoid bacilli were present, therefore, in the abscess in pure culture.

The involvement of the breasts in typhoid fever must be a very rare event, if we may judge from the scarcity of the literature on the subject; yet it has been noticed several times by some observers. In 1874

Leudet[1] recorded five cases observed personally in which one or both breasts became tender and swollen, and in which inflammatory masses could be made out in the breast tissue. All resolved without suppuration. Vallin[2] reported a similar case. Curschmann[3] states that, in his experience, mild, transitory swelling of the breasts at the height of the fever is not uncommon, and may readily be overlooked, since the patient makes no complaint. He has seen similar swelling twice in young men. Suppuration is, he thinks, very rare. Fornaca[4] has recently reported a case of typhoid fever in which pain developed in the right breast on the twenty-ninth day of the disease, three days after the temperature had been normal. This was followed by a rise of temperature and by swelling of the breast, but no fluctuation could be detected. Five days later, on an exploratory aspiration, three drops of seropurulent fluid were obtained which showed typhoid bacilli on cultures. Later a similar trouble developed on the left breast, but aspiration was negative. As both breasts healed without abscess formation, this can hardly be classed as a suppurative case.

We have been able to find records of only four cases of suppurative mastitis associated with typhoid fever. In that reported by Charlotte P. West[5] the abscesses of the breast were associated with a general pyæmic condition. At the beginning of the third week of the fever both breasts became swollen and tender, which condition was associated possibly with the hypodermoclysis of salt solution. This condition disappeared. At the beginning of the fourth week, however, localized dusky red, swollen elevations and patches were discovered on both legs, both arms, and both breasts. Those on the right leg, left arm, and both breasts suppurated, and healed after free incision. The patient recovered. No examination of the pus was made.

In 1891 Destrée[6] reported two cases of typhoid fever in men in each of which an abscess developed in the right breast at the end of the third week. The pus from each abscess showed only staphylococci.

The fourth case, reported by Capellari,[7] almost exactly parallels our own. A girl, aged fifteen years, in the fourth week of an attack of typhoid fever, developed pain and swelling over the whole right breast. This resisted all palliative treatment. The temperature, which had touched normal, assumed the septic type. Fluctuation in the breast was detected, the abscess opened, and recovery followed. No bacteriological examination was made.

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[1] Clinique Médicale de l'Hotel Dieu de Rouen, Paris, 1874, pp. 96-99 and 113-118.

[2] Bull. de la Soc. Clin. de Paris, 1877, vol. i. p. 148.

[3] Der Unterlerbstyphus, Vienna, 1898, p. 184.

[4] Sulla mastite tiposa. La Riforma Med., 1900, vol iii. p. 266.

[5] Report of an Unusual Case of Typhoid Fever; Swelling of both Breasts, followed by Suppuration; Thrombophlebitis. Philadelphia Polyclinic, 1898, vol. vii. pp. 253-256.

[6] A propos de quelque cas de suppuration compliquant la fièbre typhoide. Journal de Médecine de Bruxelles, August 5, 1891.

[7] Ascesso mammario metastatico consecutivo a tifoide in adolescente. Corriere sanit, 1900, vol. xi. p. 88.

Mastitis accompanying typhoid fever, therefore, may or may not lead to suppuration. The latter condition is probably frequently overlooked, owing, as Curschmann suggests, to the apathetic state of the patient. The onset in Leudet's five cases was in the fourth week, and Curschmann speaks of its occurrence at the height of the disease. In the right breast of our patient it occurred in the sixth week. The favorable outcome in this class of cases led Leudet to the statement that inflammation of the breasts is a matter of no moment in typhoid fever, and heals spontaneously.

Suppurative mastitis in typhoid fever must be much rarer than the form which undergoes resolution. When not a part of a general pyæmic condition, it arises late in the disease, as do most of the other true typhoid suppurations. In Capellari's case and in our own the temperature had touched normal before the mastitis began. The course seems to be mild, and no difficulty was experienced after incision of the abscess. As with other abscesses, the fever was of the septic type, increase in the number of leucocytes was present, and the neighboring glands in the axilla were enlarged and tender.

Although both Curschmann and Capellari state their convictions that such abscesses are caused by the typhoid bacillus, Fornaca's case and the case here reported seem to be the first in which this causal relation is established. The source of infection is probably through the blood, for we know that in the majority of the cases of typhoid fever, typhoid bacilli can be obtained in cultures from the blood. We failed, however, in two attempts to do so in this case; but it must be remembered that these attempts were made late in the disease, when the chances of successful cultures are much diminished. In looking for a cause for a locus minoris resistentiæ in the breast, Capellari lays stress upon the age of the patient, believing that at puberty the mammary glands are less resistant, owing to their rapid growth. In our case it is worthy of note that the patient regarded the dry cupping, used on account of her bronchitis, as the source of her trouble. The breasts are, however, usually spared in cupping, which in this instance was mostly confined to the chest, behind, and the pain at cupping was more probably the effect than the cause of the early inflammation.

It has been shown that bacteria present in the blood may pass into the milk. Basch and Weleminsky,[1] however, believe that this is only possible where a lesion, especially a hemorrhagic lesion, is present in the mammary gland. In their experimental work with typhoid bacilli on guinea-pigs they failed to obtain typhoid bacilli in the milk, even when the bacilli were present in the blood in large numbers. Since we know that gross lesions of the breast may occur in typhoid fever, it seems probable that under such circumstances, at least, typhoid bacilli might appear in the milk of a nursing woman either during or after an attack of typhoid fever.

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[1] Ueber die ausscheidung von Krankheitserregern durch die Milch. Jahrb f. Kinderheilkunde, 1898, vol. xlvii. p. 105.

REPORT OF A CASE OF LYMPHOCYTOSIS, WITHOUT GLANDULAR ENLARGEMENT, COMPLICATED WITH PNEUMONIA.

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In presenting sections of the cerebral cortex of the following case, among a number of others of epileptic mania and status, to Professor Barker, of the Chicago University, the contents of the bloodvessels and the perivascular lymph spaces were so striking that the case seemed to merit a special study by itself. The condition was at first thought to have some relation to the gross changes found in the encephalon; but this was later disproved by the finding of the same condition in the vessels of the other organs. The patient was from the service of Dr. Stockton.

Mary C., white, single, aged thirty-eight years. She was an illegitimate child, and had spent most of her life in the county poor-house before being admitted to the hospital. She had been a patient in the hospital for more than twenty years, and nothing is known of her condition physically or mentally prior to this time. During her stay in the hospital she had frequent attacks of grand mal. At times the fits were very frequent, lasting for days, these periods being followed by periods of freedom from the attacks. For two years or more she had suffered from severe constipation, accompanied by cold and clammy skin, cold extremities, and increasing dementia. For the past year she had been very anæmic, and during the last two months of her life she became so weak as to be confined to her bed, and for the greater part of this time was the subject of a severe diarrhœa, with fetid, watery discharges. This condition was accompanied at times by nausea and vomiting, and abdominal tenderness was a constant feature. Her epileptic convulsions continued during this attack, and she was exceedingly irritable and quarrelsome. The skin was very sallow, and during the last week she had many fainting spells. Her pulse averaged from 100 to 120 to the minute, and her temperature ranged from 100° to 101° F. Death gradually followed from exhaustion.

The autopsy was held two hours after death, the organs being examined in the order in which they are given below.

The body is that of a well-nourished woman, length 151 cm., weight 78 pounds. Rigor mortis present in the inferior maxilla, not elsewhere. Livor mortis marked in dependent portions. Pupils equal and regular. Nasal and aural passages clear. Tongue dry and heavily coated.

The right submaxillary gland was enlarged, and on section emitted a large amount of pus. Smears from this pus contained diplococci, but were negative for tubercle bacilli. A number of purpuric spots were present over the trunk and extremities. Œdema of both lower extremities. Fingers were slightly clubbed. There was no glandular enlargement except in the right cervical region below the suppurated submaxillary gland.

Scalp, 4 mm. thick at the vertex, and very adherent to the calvarium over a depression 1 cm. in width at the upper part of the sagittal suture.

Circumference of skull	49.3 cms.
Diameters of skull—antero-posterior . . .	15.9 "
biparietal	12.5 "
Thickness of frontal bone	1 cm.
" " temporal bone	4 mm.
" " occipital bone	1 cm.

There was no abnormality in the shape of the skull except the depression noted above, which, however, did not present on the inner surface. Pacchionian depressions were more marked on the left side than on the right.

The vessels of the dura mater were empty, not bulging. The dura was not abnormally adherent to the calvarium or to the soft membranes. Subdural fluid clear and not abnormal in amount. The inner surface of the dura and of both sides of the falx cerebri were covered with a thick layer of rusty, hemorrhagic deposit, which could be readily peeled away.

The convolutions on both sides of the encephalon, especially in the region of the Rolandic fissure, showed marked atrophy, and the arachnoidal fluid was correspondingly increased, filling the widened sulci and bulging the membranes outward. The fluid was clear and straw-colored. No granulations were found upon the ependyma of either lateral ventricle wall. The choroid plexuses and basal ganglia showed no macroscopical changes.

Weight of the encephalon and fluid . . .	1 k.
" medulla, pons, and cerebellum . .	130 grms.
" left hemisphere	420 "
" right hemisphere	425 "
" fluid	25 "

The pons, cerebellum, and medulla showed no gross changes except a few minute granulations upon the floor of the fourth ventricle. Sinuses and dura at the base of the skull normal.

Sectio Corporis. The subcutaneous fat was lemon-yellow in color and measured 1.5 cm. at the umbilicus. The liver presented in the incision was very light yellow in color, and projected 1.5 cm. below the umbilicus in the right mammary line, or 13 cm. below the tip of the ensiform cartilage in the median line.

The muscles were pale and fairly well developed. The omentum projected well down into the pelvis. The stomach extended 13 cm. below the ensiform cartilage in the left parasternal line, *i. e.*, about 2 cm. in this region below the liver.

The diaphragm on the right side reached the third interspace; on the left side to the fourth rib. The apex of the heart lay in the fourth interspace. The lungs and heart were displaced upward by the enlarged liver.

Left visceral pleura was densely adherent to the parietal layer by old, fibrous adhesions from the second to the fifth rib and over the posterior surface. Left lung weighed 360 grammes. Its interlobar pleuræ were densely adherent, and there was considerable hypostasis hæmatis in the dependent portions; otherwise the cut surface was crepitant and apparently normal.

Right pleural layers were bound together over their outer and posterior surfaces by numerous old adhesions. The lung was very similar to the left, except that in the posterior lower portion of the upper lobe there was a patch of pneumonia about the size of a lemon. This area was reddish-gray in color and non-crepitant.

The heart weighed 230 grammes. Thickness of left ventricle wall, 9 mm.; of right ventricle wall, 3 mm. The valves were normal, and the muscle very pale, but firm. The aorta had a number of sclerotic patches and calcareous plaques in its arch, and two calcareous plaques, 1 cm. in diameter, near the bifurcation of the abdominal aorta. Coronary arteries were normal.

The liver weighed 2340 grammes; 26 x 23 x 11 cm. Very large, light yellow in color; surface smooth; periphery of the lobules paler than the centre. The gall-bladder was filled with dark green bile, and contained no gallstones. The hepatic, cystic, and common ducts were normal and patent.

The pancreas and adrenals were normal.

The spleen weighed 240 grammes; 16 x 8.5 x 5.5 cm. Surface smooth, slightly mottled, and grayish in appearance. The substance was firm, cut with difficulty, and the cut surface was dark red in color, dry, and the Malpighian corpuscles plainly seen.

Ureters normal.

Left kidney weighed 130 grammes; 11.5 x 5 x 4 cm. The kidney was very pale, its surface was smooth except for a small retention cyst upon its posterior border; the capsule was more adherent than normal, and the cut surface was granular; width of parenchyma 2 cm., cortex 5 mm., medullary rays were wider than normal, and the glomeruli scarcely to be made out. The right kidney was very similar to the left.

The stomach was filled with a pale greenish mucous fluid. Its mucous surface was marked by longitudinal ridges, which were marked on their summit by red, hemorrhagic lines. These lines converged at a ring, 5 or 6 cm. from the pylorus, and then from here spread out again toward the pylorus. Measurements, 6 x 18 cm.

Uterus, vagina, ovaries, and Fallopian tubes normal.

Small intestine was normal except in its lower two feet. This portion was much congested, and on its mucous surface contained a number of small ulcers, irregular in shape, varying in size, with raised edges, necrotic bases, and injected peripheries.

The caput coli was intensely congested, and was studded over with small ulcers with gray bases, red peripheries, and raised edges. These ulcers varied in size from a pin-head to a bean. They extended from the caput to the rectum. In the rectal mucosa were several varicosities, and here and there a larger ulcer 1 to 2 cm. in diameter.

Larynx, trachea, pharynx, œsophagus, and thyroid gland normal.

Bacteriological examination negative, except that colon bacilli were obtained in the cultures taken from the kidney.

Microscopical Examination. The dura mater is thickened, and on its inner surface is a dense layer of connective-tissue cells in a state of active division. Inside of this, again, is a layer of hemorrhage in which the red blood-cells, intermixed with leucocytes, are undergoing degeneration, but whose outline may still for the most part be made out. Still further inward is another layer of connective-tissue corpuscles, and from both of these two layers of connective-tissue cells limiting the hemorrhage there is an extension into it, which in places has resulted in quite an extensive organization of the extravasation. Apparently the hemorrhage has taken place between the inner layers on the inner surface of the dura, raising the innermost layer with it. The vessels of the dura are the seat of a considerable thickening, affecting chiefly the intima and causing at times almost complete obliteration. In those vessels containing blood there is found a very large number of lymphocytes; in many places quite as many lymphocytes are found as red blood-corpuscles, and very seldom is it possible to find a polymorphonuclear cell among them. In the neighborhood of a number of the capillaries there are found minute hemorrhages into the lymphatic spaces, apparently recent from the good condition of the red cells and lymphocytes.

The heart muscle takes the stain for the most part very poorly, and in places the striation is very indistinct. Gathered about the nucleus of the majority of the fibres, and most abundant in the palest of them, are minute granules of yellow pigment. In places also throughout the sections the fibres contain numerous minute fat-droplets. In the veins and capillaries throughout the heart muscle section is found the same increase in the number of small mononuclear cells.

The liver, owing to the very evident fatty condition, was injected with formalin and preserved entire in the same fluid, so that the portal system through which the fluid was injected was quite empty of blood. Where there was any blood remaining, however, there was found the same large number of lymphocytes as elsewhere. There was some commencing fibrosis evidenced, and in the portal areas the large increase in the number of lymphoid cells was very noticeable. The fatty change in the liver cells was extreme, and scarcely a cell was to be found which did not contain a large globule of fat pushing the nucleus to one side; the nuclei, however, still took the hæmatoxylin stain well.

The adrenal capsule presents nothing abnormal except that in the bloodvessels throughout its substance, and in the capsule, is found the same condition as has just been described.

In the pancreas, besides the increase in the number of lymphocytes in the vessels, there is some interlobular fibrosis.

The kidneys present well-advanced interstitial changes, especially involving the glomerular capsules; also thickening of the intima and media of the vessels. In the connective tissue throughout the organs are found areas of densely packed lymphoid cells. In all the vessels, in the capillaries of the tufts, and elsewhere, the great abundance of small mononuclear cells is very noticeable.

In the pneumonic portion of the lung a very strange and interesting condition is found. The alveoli are crowded with a variety of cells, including red blood-cells, large transitional cells, epithelial cells, large phagocytic cells, lymphocytes, and polymorphonuclear leucocytes; but by far the vast majority of the cells are of the last-named variety, *i. e.*, the polymorphonuclear leucocytes. Still, when one turns to the bloodvessels and capillaries in the alveolar walls, there are very few polymorphonuclear cells to be found in their contents, but an abundance of lymphocytes is always found; especially is this so of the capillaries. Further, where one finds hemorrhages into the alveoli one finds always among the red blood-cells numerous lymphocytes, and these cells are almost wholly confined to these regions.

In the central portions of the ulcers the mucous membrane of the colon is quite destroyed, the floor of the ulcer being formed by the much thickened submucosa covered by a dense layer of pus-cells. The edges of the ulcer are shelving, and contain the remains of the tubules of the mucous membrane infiltrated with the lymphoid cells. The gland tubules further out near the periphery of the ulcers, and the submucosa underlying the whole ulcer, but especially its central portion, are very densely packed with lymphoid cells. There are also numerous lymphoid collections in the two muscle layers of the intestine in this region. The bloodvessels throughout these sections are filled with blood elements, but extremely noticeable is the very large number of small mononuclear cells present; here they form at times the majority of the cellular contents of the vessels, at times appearing almost as an embolus. The lymph follicles in the sections are swollen and densely packed with cells. The capillary vessels would seem often to end or open within the lymphoid masses.

In the stomach wall many of the papillæ have disappeared, the remains of the mucous layer are densely infiltrated with lymphoid cells, and on the surface are found many small hemorrhages. These were noted in the gross description as hemorrhagic dark lines. The same condition exists in the vessels here as elsewhere.

Sections were taken from the paracentral lobule, the precentral lobule, the temporal lobe, the medulla, and cord. These sections were stained by Nissl's method, thionin, eosin, and methylene blue and hæmatoxylin and eosin. In all of these sections the condition which first attracted the attention was very striking; that is, the presence within the vessels, and occasionally within the perivascular lymph spaces, of a great number of small mononuclear cells, in which scarcely any cell-body could be made out. These cells do not differ in any way from the small lymphocytes of the normal blood and lymphatic tissue, and are readily distinguished from the neuroglia nuclei, being much smaller, more deeply stained, and containing larger granules than the latter cell-nucleus. They are seen very readily in the Nissl and thionin preparations, and at times form almost an embolus in the smaller vessels. With the eosin and methylene stain no plasma cells could be found in the vessels.

The large motor cells in the paracentral lobule, in the medulla, and in the cord are, as a rule, normal; but among them one finds frequently cells in which the nucleus has an eccentric position, and occasionally one in which the nucleus is swollen and diffusely stained. In a number of them the nucleolus is found vacuolated; but this, as a rule, is quite regular in outline.

In the smaller and larger pyramidal cells of the cerebral cortex the nucleolus is almost always at the side of the nucleus, especially in the former. The nucleolus is irregular in shape, with frequently spicules appearing at its circumference. The nucleus is at times swollen, filling almost the whole cell, and in these the nucleolus is pale and shrunken or has disappeared entirely. The dendrites are not seen for any great distance from the cell, but the chromatophile substance has in these and in the periphery of the cells often a very crumbly appearance. The Purkinje cells in the cerebellum are apparently quite normal.

It is to be regretted that the blood examinations were not made upon the above case during the life of the patient, and yet without doubt the case is one of lymphatic leucocythæmia, from the very great number of lymphocytes found in the bloodvessels. The value of the case is also somewhat lessened by the lack of a post-mortem examination of the bone-marrow, but as nothing in the case as reported suggested the condition found, and as this does not form part of the routine examination of the laboratory, it was neglected; through some mistake, also, the spleen was not placed along with the other organs for microscopical examination, still in spite of these deficiencies the case presents a number of features of interest which render it worthy of report.

These may perhaps be summarized before entering into any discussion of the case.

Clinically, constipation, followed by diarrhœa, pallor, rapid onset of terminal dementia, persisting epileptic attacks, fainting spells, and varying fever.

Post-mortem Examination. Suppuration of the submaxillary gland, purpura over the trunk and limbs, absence of lymph glandular enlargement, subdural hemorrhages, atrophy of the convolutions, extreme fatty liver, fatty heart, enlarged spleen, hemorrhages into the stomach and intestines, and chronic ulcerative colitis.

Microscopically: The presence of the very large number of lymphocytes in the bloodvessels, of all the organs, and the rarity of leucocytes of other forms, congestion of the veins, large increase in the lymphoid tissue in the alimentary tract and kidney, the apparent opening into these lymphoid masses of minute bloodvessels, the peculiar occurrence (*a*) in the pneumonic portion of the lung of polymorphonuclear leucocytes in the alveoli, with the persistence of the lymphocytes in the bloodvessels and capillaries, and (*b*) in the pus from the submaxillary gland and the changes in the cells of the cerebral cortex.

The case is further of interest in the support it would seem to lend to the theory of Ehrlich and Lazarus,[1] that in lymphatic leukæmia "the increase of the lymph cells is brought about by a passive inflow into the blood, and not by an active emigration from chemical stimuli."

At the present time the origin of the lymphocyte in the blood is generally accepted as the lymphoid tissue of the organism, since this cell conforms in every way to the lymphoid cell. Clinical evidence also would seem to prove a similar genesis for these cells in the bloodstream. In this case, then, with this origin granted and the lymph glands not enlarged, with the exception of a few in the neighborhood of the suppurating submaxillary gland, one is thrown for an explanation of their occurrence upon the spleen and lymphoid tissue elsewhere.

The spleen in the present case was larger than one usually finds at autopsy, and yet it comes within the limits of those given for normal weight of the organ (100 to 300 grammes[2]), weighing only 240 grammes.

The work of Kurloff, in Ehrlich's[3] laboratory, on the extirpation of the spleen in the guinea-pig has gone to prove that the spleen in this animal, at least, plays a very unimportant part in the formation of white blood-corpuscles. Kurloff found that the spleen was not indispensable, and that after splenectomy in the first year compensation occurs only in the lymph glands, followed in the second year by a great increase in the eosinophile cells. The study of cases of splenectomy in man, also, is analogous to the above, as the following conclusions, as a result of the researches by Hartman and Vasquez[4] on the extirpation of the spleen for tumors, will indicate:

1. A slight post-operative increase in the number of red blood-corpuscles and a true hyperleucocytosis occur and pass rapidly away.
2. Four to eight weeks afterward a lymphocytosis of varying duration is established.
3. Later, after many weeks, a moderate eosinophilia occurs.

It would seem from this that the exclusion of the spleen as a factor in the present instance is justifiable.

We have, then, left the great mass of lymphoid tissue in the intestinal tract and other organs, which, in this instance, is so much increased in amount; and, further, from the opening into these masses of lymphoid cells of small bloodvessels, which are abundantly filled with cells of quite the same type as those forming the masses themselves, it would seem very probable that their origin lies here, and that their presence in the vessels is a result of mechanical processes.

Ehrlich[5] has laid much stress upon the influence of the digestive tract in the production of lymphocytosis, the evidence coming mainly from the digestive leucocytoses, in which the lymphocytes are increased in number, from those cases of intestinal disease in infants in which lymphocytosis has been found,[6] and from typhoid fever, in the later stages of which a lymphocytosis is found.[7] No cases could be found in the literature at hand of differential counts made upon cases of chronic ulcerative colitis or of constipation, so that a comparison of the present case with others was not possible.

The question naturally arises, however, as to the priority of the two conditions found, viz., the chronic ulcerative colitis and the lymphocytosis. Was the condition of the bowel the primary one, with resulting lymphocytosis? or was there, as a result of some other toxin affecting the lymphoid tissue of the intestinal tract alone, a hyperplasia of this produced, which was later followed by ulceration, the original hyperplasia being responsible for the lymphocytosis?

From the lack of clinical data an answer to these questions is impossible. One might theorize without accomplishing, in the present instance, any result. The colitis was, however, of long standing, from the thickness of the bowel wall present and the extreme fatty condition

; also from the clinical evidence of prolonged constipation,
diarrhœa of six weeks' duration, which ended in her death.
terest is the evidence in support of the theory that the
blood-stream play no part in ordinary inflammatory
s allied to that of Neumann,[8] in which he produced
f lymphatic leukæmia, and in the pus found ex-
lear cells. Here, in the pneumonic portion of
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e has occurred does one find lymphocytes
s, although the capillaries in the alveolar walls
ytes in very large numbers.

us of the suppurating submaxillary gland also the majority
e cells are of the polymorphonuclear variety, while in the vessels at the periphery the same majority of lymphocytes is found; still, the polymorphonuclear cells in the vessels are here not so rare as elsewhere.

The hemorrhages, subdural and into the mucous membrane of the stomach and bowel, the purpura, and the fainting spells are frequent concomitants of the condition of lymphatic leukæmia, and need no further comment here.

The changes in the nerve cells of the cortex were probably due in part to œdema, as described by Hoch,[9] from the lingering nature of the death of the patient, in part to the toxic condition, and possibly also in part associated with the macroscopic atrophy of the convolutions.

While the incomplete nature of the above report renders it less valuable than could be desired, yet the following conclusions would seem to be justified:

1. That a lymphocytosis may result, where there is absence of enlarged lymph glands, from increased lymphoid tissue in the intestine.
2. That the presence of these cells in the blood-stream is probably due to mechanical causes (Ehrlich).
3. That the lymphocytes in the blood-stream play no part in ordinary inflammatory conditions.

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SYMPTOMS POINTING TO THE NECESSITY FOR OPERATIVE INTERFERENCE IN MASTOID SUPPURATION.[1]

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The diagnosis of suppuration of the mastoid antrum and cells is a subject of much interest to the otologist.

In the majority of cases it is not difficult for one who has had considerable experience to make such a diagnosis. To the less experienced it is a more formidable undertaking; while to those having no special knowledge of ear diseases the diagnosis is never made until the symptoms have become so apparent that, almost, " he who runs may read " them.

The great importance of diagnosis in this diseased condition cannot be overestimated, and he who makes an early diagnosis renders valuable service to his patient.

In selecting the proper time for operative interference in mastoid complications of suppurative middle-ear disease the judgment of the operator is frequently subjected to a severe test. While opinions may vary to a marked degree, from operating at the very commencement of mastoid involvement to a delay which may lead to extensive complications, there certainly must be a period in the history of every case when operation should be no longer delayed, and the object of this paper is to endeavor to outline those symptoms which may be looked upon as pointing to the necessity for operative interference. With opinions and experiences so varied, as no doubt have been those of the otologists present at this meeting, it is not to be expected that the conclusions of anyone will meet with the approval of all. For convenience the topic will be divided into chronic and acute mastoid suppuration.

By acute suppurative involvement of the mastoid we mean an extension of the suppurative process from the middle ear into the mastoid antrum and cells during an acute attack of middle-ear suppuration. This is the generally accepted definition. On the other hand, during a chronic middle-ear suppuration there may occur an acute mastoid involvement. This last-named condition is, however, more often spoken of as chronic.

A discussion of the indications for operation upon the mastoid in acute cases is specially fitting at this time, when—partially as a result of the season through which we have passed, but more so as a result of the prevalence of the grip—all practitioners of medicine are being called upon to treat numerous cases of acute suppuration of the middle ear. In all grip cases there is present a large amount of infectious material in the nose and nasopharynx. The characteristic cocci of this infection are the streptococci, staphylococci, and pneumococci. The accompanying inflammation and tumefaction of all the intranasal tissues so obstruct the nasal channels that ordinary blowing of the nose is attended with more or less danger, for some of the infection may enter the Eustachian tube and become the exciting cause of acute middle-ear suppuration—a suppuration which is peculiarly violent, virulent, and rapidly destructive to all tissue with which it comes in contact.

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[1] Read at the Eastern Section meeting of the American Laryngological, Rhinological, and Otological Society, held at Buffalo, N. Y., 1901.

It would seem that physicians in general do not fully comprehend the very great danger to the ear attending attacks of the grip, and it is equally true that much of this danger could be avoided by proper treatment of the nose and nasopharynx during the time of its ravages. To keep the nose and nasopharynx free from infection, or comparatively so, is to render the Eustachian tube much less liable to an invasion of bacilli.

It should be the routine practice in both private and hospital practice to make microscopical examinations of the pus in all acute cases of middle-ear suppuration, and if streptococci or staphylococci are present we know the tendency to mastoid involvement to be much greater than otherwise would obtain. When microscopical examination of the pus is made the report should state which cocci predominate. It has been rather conclusively shown that pus is more virulent when the streptococci are in excess.

Blood examinations also, while not absolutely necessary in uncomplicated cases, may be of greater service when infection of the lateral sinus is expected, and it is strongly urged that in all cases where general infection is suspected such examination should be made.

Other things being equal, knowing the rapidly destructive nature of the pus just described, with its tendency to migrate into tissues far beyond the confines of the middle ear, even to the blood sinuses and brain tissue, the knowledge of this pus characteristic would lead one to operate much earlier than if it appeared upon microscopical examination to be free from this infection. Acute mastoid disease may be described as mastoid involvement appearing during the course of an acute suppuration of the middle ear, the symptoms of which may be described somewhat as follows: Always bear in mind that upon these symptoms must be based one's final judgment as to operation. Perhaps the most marked symptom of mastoid involvement is pain. This pain usually comes on some time after the excruciating pain which precedes suppuration of the middle ear has passed away and after the discharge from the ruptured or incised drum has been established. It is a dull, heavy pain, not definitely localized like the pain of acute suppuration of the middle ear, but rather diffused over the surface of the temporal bone. Patients frequently describe a feeling like a weight upon the head. This pain is not so severe as in the middle ear, and is located behind and above. With it the patient describes a feeling of fulness, heaviness, and pressure over the entire parietal region. The pain may or may not be constant, and may or may not depend upon free or diminished discharge from the external canal, but it is usually present at least to a slight degree. Another prominent symptom is tenderness upon pressure. This tenderness is usually marked at the tip of the mastoid, but is more significant when it is present higher up, just over the mastoid antrum; and more recently we have come to attach more importance to tenderness in this region than to the same condition when lower down at the tip. The mastoid tip may be tender on pressure when no disease is present. Temperature must also be considered, but it must not be relied upon as pathognomonic in any degree in mastoid involvement. In young children it is usually present and rather high. In adults, even with extensive mastoid involvement, the temperature may not be particularly disturbed. It must be borne in mind, however, that in certain complications like sinus infection the temperature may be very high or subnormal, in which case it becomes a very important factor.

A not unimportant symptom of mastoid suppuration is the facial expression. This expression is not especially one of agonizing pain; the countenance rather is indicative of anxiety; it is altogether an extremely unhappy expression. The head usually hangs forward, with an inclination to lean toward the healthy side. To one whose privilege it is to see large numbers of mastoid cases the observation of this symptom must become a valuable adjunct in completing the diagnosis. I have frequently, from a row of waiting patients in the clinic-room, pointed out cases suffering with mastoid complication from the facial expression alone.

External periostitis, with or without infiltration of the soft tissues, certainly must be considered as a symptom, although, as a rule, operative interference should be resorted to long before these symptoms appear. When present they must be considered rather as a complication than as a symptom of the disease itself. The drum membrane must not be overlooked in making a diagnosis of mastoid involvement, especially that portion known as Shrapnell's membrane or the attic region. When this membrane, together with the posterior superior portion of the wall of the canal, is found to be bulging downward and forward into the canal, giving it the appearance of being narrowed from above downward, a picture is given which constitutes one of the two most prominent symptoms of mastoid suppuration. The other prominent symptom to which I refer is tenderness upon pressure over the region of the antrum. To define the relation of these two symptoms to surgical interference, I would say that prolonged tenderness upon pressure over the region of the antrum, together with bulging of the atticus tympanicus and the superior posterior wall of the canal, constitutes sufficient reason for operative procedure, and especially so when the pus contains streptococci or staphylococci.

Suppuration in the mastoid bone must be considered as a complication of suppuration of the middle ear; but there are many further complications which may and often do complicate the mastoid suppuration. The symptoms of these complications, while not strictly a part of this paper, the scope of which is confined to the indications for operating, may, however, be briefly mentioned. I refer to rigors, vomiting, vertigo, choked disk, aphasia, paralysis of the extremities, high temperatures, facial paralysis, dull mentality, uneven pupils, so-called typhoid conditions, etc. All of these symptoms indicate that the suppurative process has gone far beyond the mastoid cells into either the lateral sinus, the dura, the cerebrum, or the cerebellum, and when these symptoms are present we know that there can no longer be any possible doubt as to the necessity for operating. It may be possible to have a non-suppurative involvement of the mastoid cells, a mere congestion; but such a condition is hardly probable. The first stage of a suppuration may be a catarrhal congestion, but we must be led to conclude that when inflammation of the mastoid cells is present that involvement is suppurative in character. This opinion is greatly strengthened by the fact that we practically find mastoid involvement only in the presence of middle-ear suppuration. Knowing this to be true, the moment the symptoms of mastoid suppuration become apparent we are face to face with the necessity for a decision whether or not we shall operate. The very early symptoms may be and sometimes are relieved by measures other than external operation. Free incision of the drum membrane carried well through the attic region into the external canal, allowing the escape of pus, will often completely relieve all indications of mastoid involvement. In fact, the whole theory of such relief is based upon the importance of free drainage, so that even when the antrum itself is involved the necessity for further involvement of the mastoid cells is taken away by establishing such drainage. This, together with local blood-letting by means of real or artificial leeches, and with the ice-coil or hot poultices, should be abortive in a small percentage of cases. During the early stages of middle-ear suppuration, and even after mastoid symptoms appear, irrigation with hot sterile water is commendable treatment.

Hot douches, when used, should be from 100° to 110° F., and large quantities of water should be employed at each treatment. These treatments should be frequent, the douche being used once or twice each hour.

The great tendency is to make use of these for too long a time; I refer especially to the ice-coil and to the hot poultice. The ice-coil should not be used longer than twenty-four or thirty-six hours, after which time it may become a dangerous application on account of its proneness to mask the symptoms. Continued use of poultices may be almost as bad; in fact, any prolonged attempts to abort mastoid suppuration are to be deprecated. In my judgment the greatest results in the way of prevention are to be obtained from free drainage of pus through the drum, although the other methods should be given a fair trial, providing they are used early in the history of the case.

At the very onset of mastoid involvement the patient should be placed in bed, and he should remain there until all symptoms have passed away; in short, he should be treated as any other patient suffering from a serious disease.

Next to free draining, this procedure should be given the highest place in the list of preventive measures.

External operation should be performed in acute suppurative inflammation of the mastoid cells when a permanent remission of symptoms has not been brought about by free drainage through the drum membrane, or by the application of ice-coils or poultices, or from local blood-letting, and when this time has arrived there should be absolutely no delay in operating—the sooner it is done the better it will be for the patient. The majority of the hospital cases and many of the private cases have already reached this stage before we see them, and it is a mistake to attempt to abort under such circumstances. It is at this very point that many otologists waver, and, by still further delay, complications arise which may make the operation much more extensive and jeopardize the patient's life. Just when the exact time arrives may not be measured by days or hours. The date must be determined by the good judgment of those who have the patient in charge.

Many delays in operating come either from lack of willingness to consent upon the part of the patient or his family or from the extreme conservatism of the family physician. Conservatism is a quality not to be ignored, but when carried to the extreme it reacts to the great detriment of the patient. The same statement may be equally true when applied to radicalism. Indeed, it is quite possible for the conservative to be radical in his conservatism, and of the two it would seem to be preferable that one should be conservative in his radicalism rather than radical in his conservatism.

Another strong point in favor of early operation is the better hearing results to be thus obtained. Early operation usually will be followed by practically perfect hearing on the affected side.

It must not be forgotten that pus pent up in the mastoid cells is in a position seriously to menace nearby vital structures. Not more important is it to remove the suppurating appendix than to open suppurating mastoid cells.

In my experience, especially in grip cases, the destructive process is so rapid that one frequently has to operate soon after the onslaught of the disease.

A recent experience may serve to indicate what is meant by the above statement.

CASE I.—" X.," child, aged eight years, had an attack of grip commencing January 10, 1901. January 12th pain in the ear began, followed by suppuration. On the 14th pain was relieved until the 16th, when severe mastoid symptoms manifested themselves; by the 19th the mastoid had become very tender, and on the 20th, when I first saw him, the symptoms were so severe that the question of palliation was not to be considered. Operation on the 20th revealed pus not only in the antrum, but in the cells at the very tip of the mastoid, so that three days after the first mastoid symptom the proper date for operating had come. In fact, it would have been better in this case could the operation have been performed a day later.

CASE II.—W. W. W., male, aged thirty-two years, had an attack of grip dating from April 1, 1901. During the night of April 4th he had a severe attack of middle-ear pain; April 5th I first saw him and found the drum membrane bulging both in the attic and posterior quadrant. A free incision was made, which was followed by pus and free hemorrhage. On April 6th mastoid tenderness developed; on April 7th he was admitted to the hospital, where the hot douches were continued. He remained in bed during the entire illness. On the 9th, at noon, the mastoid was opened and excessive involvement was found, the bone being softened and necrotic over a wide area, and the lateral sinus was fully exposed during the operation; the pus in this case was found to be loaded with streptococci, staphylococci, and pneumococci. These two cases illustrate the rapidity with which the mastoid may become involved in certain cases.

If microscopical examination of the pus from the middle ear in a case presenting symptoms of mastoid involvement reveals the presence of streptococci, staphylococci, and pneumococci, it is my belief that no amount of palliative treatment will have any effect upon the final result, and we usually find this condition in grip cases, so that it would seem wise, especially in this class of cases, not to delay operative interference; this is especially true if streptococci predominate. I do not mean to be understood as advocating an operation during the first few hours of mastoid involvement in the cases referred to above, because during that time palliative measures should be resorted to. It is agreed by many operators that even if pus be not found no harm has come to the patient from operation, as a patient always recovers; but to me this argument does not appeal. It is unfair to subject a patient to an operation simply because it will do him no harm. In mastoid operations it is necessary that we positively determine mastoid involvement, after which there should be no hesitancy as to the necessity of operative interference. It is possible that to delay operative interference may not result in great danger to the patient, and occasionally an apparent temporary recession may be obtained, but even under these circumstances the whole trouble may light up anew at any time, making operation necessary, and delay of this kind must be attended with more or less danger of still further complications, many of which are attended with serious menace to life.

With such views as have been expressed in this paper in favor of early operative interference one might expect that in a large hospital service a fair percentage of the cases operated upon would reveal no pus or diseased tissue; but so far as my own experience is concerned this is not true; neither is it, I believe, in the service of others in the large hospitals.

During the last season I have not failed to find pus or necrosed tissue in a single instance.

The method of operation adopted should carry out this one prime necessity, namely, that all diseased tissue should be removed. The location of the incision, its length, and the method of removal of the external table may vary, but these variations are not of very great importance so long as the vital point above mentioned is carried out.

It is not the purpose of this paper to enter far into the domain of treatment, but it has seemed wise to call attention to the necessity for thoroughness.

A word or two in regard to the Wilde incision: Aside from such benefits as come from local blood-letting, nothing may be expected from this incision except the annoyance of having an open wound to contend with in a nearby location. To me the Wilde incision has always seemed a very wild incision to make. It has been stated that if upon making the Wilde incision the external table seems healthy no attempt should be made to enter the cells. Experience, however, does not bear this out, as patients suffering from mastoid involvement should be given the benefit of operative relief long before the disease has progressed far enough to break through the external table.

Local blood-letting may be obtained by much simpler methods, and there can be no necessity for ever making a Wilde incision.

CHRONIC SUPPURATION. Long delayed suppuration of the middle ear attended with involvement of the attic, and possibly the antrum and mastoid cells, may lead to the necessity for external operation in order to overcome the suppurative process. This is especially true in cases of chronic otorrhœa, the discharge of which is offensive, and with the presence of cholesteatomatous masses and carious bone. Only by external operation in many instances are we able to indulge in any hope of permanent relief. That a chronic otorrhœa is attended with more or less danger to life will not be denied. Such danger may not be great, and fatal cases may not be frequent, but the danger still exists. It is well known to most of you that life insurance companies at the present time refuse absolutely to accept as risks any persons who suffer from chronic discharge of the middle ear. An attempt should certainly be made to cure permanently all cases of chronic otorrhœa. Local measures—removal of the necrosed ossicles and of other known methods—should be made use of before resorting to external operation.

INFECTION OF THE RECTUM, WITH SECONDARY INFECTION OF THE LIVER, CAUSED BY THE BACILLUS INFLUENZÆ SIMILIS.[1]

By W. Ophüls, M.D.

(*From the Pathological Laboratory of Cooper Medical College, San Francisco, Cal.*)

The following case of what appears to be an infection with a bacterium belonging to the group of the influenza bacillus seems interesting enough to be put on record. I am greatly indebted to Dr. J. O. Hirschfelder for his allowing me to make use of the clinical history of the case in this paper.

J. B., aged thirty-six years, single, Austrian, laborer in mine, admitted November 29, 1900. Service of Dr. J. O. Hirschfelder. On admission: temperature 102°, pulse 100, respiration 48. Patient complains of severe chills, cold on chest, cough, and general malaise. No diseases of childhood. Father died of smallpox, mother of unknown cause; one brother alive and well; denies venereal history; drinks moderately and smokes excessively; has never been sick before, except with severe cold.

Present trouble came on eight days ago. On coming from Angel's Camp to Stockton he took a severe chill; was compelled to lay off for four or five days in Stockton. Then came to San Francisco; was in bed five days, while in Stockton most of the time. Arriving in San Francisco he went to the Receiving Hospital, and remained overnight. Was brought to the City and County Hospital November 28, 1900. Complains now (November 29th) of chills, followed by sweats, cough, expectoration of blood and mucus, sore-throat, headache, loss of appetite, diarrhœa for the last week, and jaundice.

Physical Examination (Dr. Hirschfelder). Patient well developed, fat, markedly icteric; head, no peculiarity; pupils equal, react to light; no scar in pharynx; gums normal; neck, nothing abnormal; cervical glands slightly enlarged; thorax well developed, deep, broad. Right side moves less than left. Tongue slightly coated. Flatness of right lower lobe. Bronchial respiration and râles of varying size. Sputum brownish-red, mucous. Area of cardiac dulness: third rib, left sternal border, fifth space, 2 cm. left of mammillary line. Tones clear, marked accentuation of second pulmonic sound. Abdomen distended; region of stomach sensitive; no tumor palpable; liver, 13 cm. in diameter;

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[1] Read at the Thirty-first Annual Session of the Medical Society of the State of California.

consistency somewhat increased. In region of gall-bladder smooth, round mass felt, not sensitive. Spleen extends to anterior axillary line, not palpable. Right inguinal hernia, easily replaced. Inguinal glands slightly enlarged. No scars on penis.

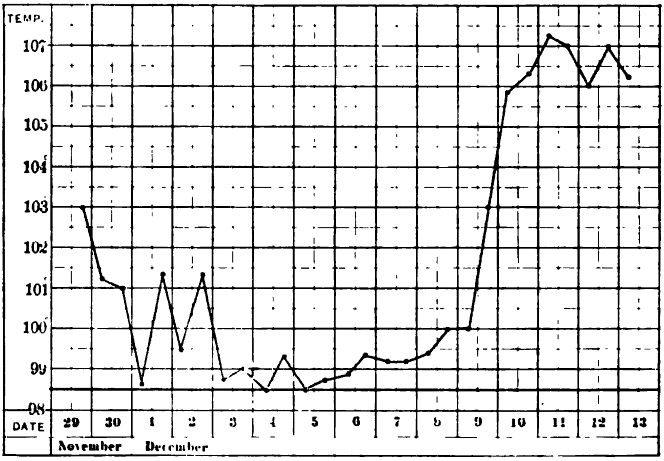
November 29th. Patient decidedly icteric; had severe nose bleeding. Pulse 82, full, regular.

30th. Nose bled twice during the day.

December 1st. Nose bled twice this morning; sweat some during the night; tongue coated with brownish-gray coating. Dulness in right lower lobe of lung continues; liver, 11½ cm. in diameter; abdomen somewhat distended. Region of gall-bladder sensitive; spleen not enlarged.

3d. Urine: specific gravity 1016; reaction acid; albumin, trace; sugar, diazo reaction, indican negative. Bile pigment present.

5th. Patient decidedly more icteric.



10th. Patient somewhat more icteric. Pulse 80, full. No dulness of the lungs, vesicular respiratory murmur. Area of cardiac dulness: lower border of third rib, left sternal border, sixth interspace, 2 cm. to left of mammillary line; tones clear; liver 9 cm. in diameter, consistency somewhat increased; gall-bladder not palpable; spleen not enlarged; abdomen not distended.

11th. Pulse 106, respiration 46. Tongue coated with grayish fur; right pupil somewhat larger than left; no dulness of lungs; both tonsils somewhat reddened; on right tonsil yellowish deposits.

12th. Pulse 108, respiration 48. Slight tonsillitis; very small patch on right tonsil; lungs normal; numerous râles are heard over anterior portion of chest; systolic murmur at apex and pulmonic valves; tones at apex indistinct; liver 10 cm. in diameter; spleen not enlarged; abdomen somewhat distended with gas; region of gall-bladder sensitive; gall-bladder palpable; slight ileocæcal gurgle; tongue moist, coated.

13th. Patient decidedly more icteric. Pulse 116, fairly strong; tongue coated; dulness of right lower lobe of lungs; bronchial breathing; a few râles; liver, 16½ cm. in mammillary line; to the right of median line, 13½ cm.; consistency increased; markedly sensitive; gall-bladder palpable, painful; spleen enlarged, not palpable. Patient is so dyspnœic that character of cardiac tones cannot be determined.

Blood: White corpuscles, 7200 in c.mm.; polymorphonuclear leucocytes, 80 per cent.; small mononuclear leucocytes, 14 per cent.; large mononuclear leucocytes, 5⅔ per cent.; eosinophiles, ⅓ per cent.

Post-mortem Record. J. B., aged thirty-six years, laborer, died December 14, 1900, 8 A.M.

Autopsy, December 14th, 10.30 A.M. Strongly built, muscular, moderately well-nourished man. Shoulders slightly stooping. Slight enlargement of the femoral lymphatic glands. Slight cyanosis of lower face and neck. Skin and mucous membranes are bright yellow. Abdomen a little distended; marked rigor mortis. Liver projects two finger-breadths below free margin of ribs in mammillary line. The lower end of the omentum is fastened to the hernial sac of a small inguinal hernia on the right side. Lower border of stomach at umbilicus. A few drops of clear, yellow fluid in rectovesical pouch. Diaphragm at the fourth rib on both sides. Thorax broad, symmetric. Stringy, easily broken adhesions in the lower part of left pleura. The larger part of the right pleural sac obliterated by similar adhesions. About 100 cm. of clear, dark, yellow fluid in pericardium. Both sides of heart distended and filled with dark fluid blood. Right ventricle averages 3, left 12 mm. in thickness. Valves, aorta, coronary arteries normal, except for bright-yellow discoloration of intima and endocardium. Heart muscle normal.

Left pleura, many small hemorrhages in adhesions. Bronchi on left side empty, cyanotic. Lower lobe and posterior part of upper lobe of left lung contain little air and much blood. Anterior portion of lung normal. Right lower lobe firmly attached to the upper surface of the diaphragm. Numerous small hemorrhages in adhesions. About in middle of lateral surface of upper right lobe there is a bright yellow, dull spot in pleura, measuring about 2 cm. in diameter, and surrounded by a hyperæmic zone. The pleura in the neighborhood is a little opaque and rough on surface. Beneath the discolored pleura there is a necrotic area of light-yellow color extending about 1 cm. into the pulmonary tissue. Around it is a hyperæmic zone. The bronchial tubes on the right side contain a little bloody mucus. In one of the large bronchi of the lower lobe one finds enveloped, in a little bloody mucus, a hard, stony, irregular, grayish-white, non-obstructing concretion, 7 x 5 x 3 mm. in size (quite apparently a concretion from the tonsils or the ducts of one of the salivary glands that was aspirated shortly before death).

The mucous membrane of the bronchi on the right side is anæmic, intensely icteric, otherwise normal, even in neighborhood of foreign body. The right lower lobe of lung contains little air. Rest of lung normal. Spleen, 15½ x 8½ x 4½ cm. A few just visible white thickenings of capsule on convexity. The organ is hard, cut surface smooth, dark red. Markings distinct. Adrenals normal. Left kidney: capsule a little adherent; size, 14½ x 6½ x 3 cm. Consistency soft. A considerable amount of fatty tissue around renal pelvis. Cortex appears a little cloudy. Right kidney same as left. Appendix normal. Right testicle: slight thickening of the outer layer of the tunica vaginalis. Testis itself normal. Bladder contracted, contains a few drops of dark-yellow urine. Prostate a little large. Seminal vesicles normal. Rectum empty. Just above anus the mucous membrane shows some thick hyperæmic longitudinal folds, which are partly covered with brown sloughs. On incision two small abscess cavities are found in submucosa, near the sloughs on surface. Pelvic veins contain fluid venous blood, no macroscopic thrombi. Contents of duodenum strongly acid, not bile-stained. There is a good deal of mucus in them. Similar contents in stomach. On pressure a little orange-colored bile is discharged from bile duct. The ducts themselves are not obstructed, and are of normal size and appearance. Gall-bladder small; wall œdematous. Portal vein contains a little dark fluid. Hepatic artery normal. Stomach greatly distended. Mucous membrane in large folds, swollen, cloudy. Pancreas normal. Vena cava inferior, normal. Liver: surface shows a large number of bright yellow spots of size of millet-seed, most of them arranged in groups of twenty or more. They are surrounded by hyperæmic zones. Similar areas are found scattered all over cut surface. The small branches of the hepatic vein in their surroundings contain soft yellowish-gray thrombi. In the comparatively normal parts of the liver the lobuli show dark greenish-brown centres and light yellowish-brown peripheries. No thrombi in branches of portal vein. Slight opacity of the peritoneal covering of the right lobe of the liver. Jejunum distended, mucous membrane swollen, cloudy. Ileum, colon, appendix normal, contents moderately bile-stained. Sigmoid flexure shows slight irregular hyperæmic swellings of mucous membrane. It is covered with thick, viscid mucus. Slight enlargement of the thyroid. Rest of the organs of neck normal.

Diagnosis. Proctitis, with sloughing and abscess formation in submucosa; multiple metastatic abscesses of liver; septic thrombosis in hepatic veins, septic infarction of lung; gastro-enteritis; green icterus of liver; general icterus; pleuritic adhesions on both sides with hemorrhages in them; slight chronic and acute parenchymatous nephritis; enlargement of the thyroid; inflammatory enlargement of the spleen.

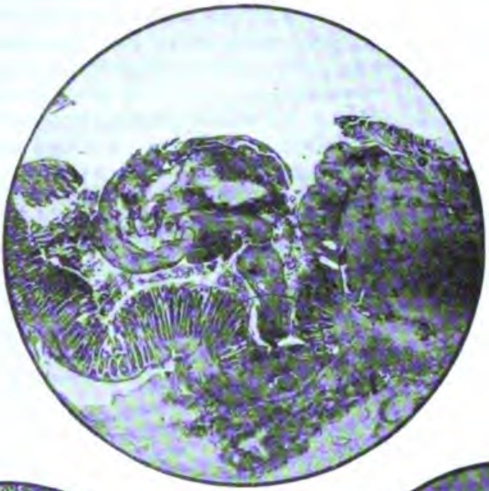
The result of the microscopical examination is the following:

Rectum. (Figs. 1 and 2.) In a number of places the mucous membrane and also part of the submucosa are destroyed. These small but deep defects are filled in and covered with old blood clots. The defects are surrounded by a thin layer of necrotic tissue, then follow layers of tissue which are very hyperæmic, full of small hemorrhages, and moderately infiltrated with lymphocytes and polymorphonuclear leucocytes. The connective tissue cells in these areas are large and seem to be increased in number. Many of them are full of minute fat droplets. There also seems to be some increase in the connective tissue fibrils.

The larger portion of the mucous membrane has normal structure and is covered with a thick layer of mucus. Many minute bacteria in irregular heaps in lower parts of blood clot and in tissue around defect. In Fig. 2 there is a small vein at the edge of which there are two large heaps of these bacteria.

Liver. (See Figs. 3 and 4.) The centres of the liver lobules show some stagnation hyperæmia, slight thickening of central veins, icteric pigmentation and stagnation of bile in bile capillaries. Many of the liver cells in centres of lobules are small and full of fat droplets. There are very many moderately large irregular areas in which the hepatic tissue is completely necrotic. In the necrotic material and in the liver cells

FIG. 1.



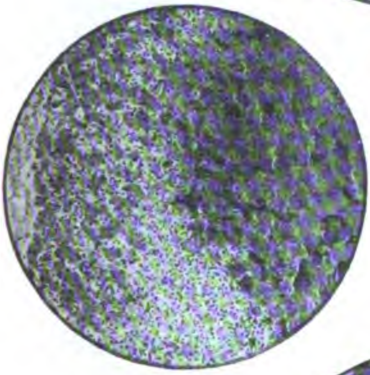


FIG. 3.

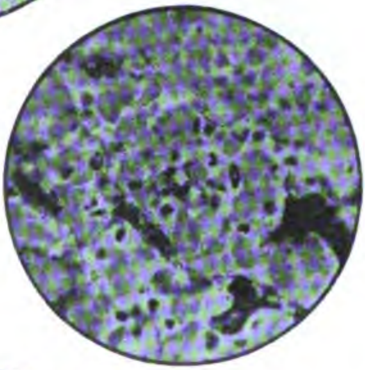


FIG. 4.

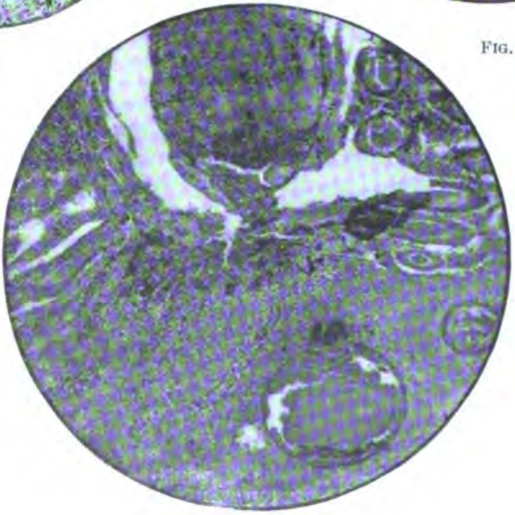


FIG. 2.

in surroundings of necroses there are some minute fat droplets. The necrotic material appears finely granular under the microscope. In the middle of some of the necrotic areas there is evidence of beginning liquefaction. The necrotic layers are surrounded by a cellular layer which consists largely of epithelioid cells with some lymphocytes and polymorphonuclear leucocytes. The cells near the necrotic material show pyknosis, caryorrhexis of their nuclei, and other signs of degeneration. Small branches of the hepatic vein in the neighborhood of these areas show fatty degeneration and necrosis of their wall. They are filled with thrombi that consist of fibrin, agglutinated blood platelets, and small heaps of fat granules. In the periphery of the necrotic areas and in the outer layers of the cellular tissue around them there are very many minute bacteria in thick, irregular heaps which in many places are situated in and follow the course of the capillaries. Similar bacteria are found in thrombi of the hepatic veins. No cocci to be found in sections stained with Gram's method. The bile ducts, unless secondarily involved, are normal.

Lung. Right upper lobe. Large, irregular necrosis. At apex of necrosis a branch of pulmonary artery, which is filled with a thrombus consisting of agglutinated blood platelets, leucocytes, and some epithelioid cells. In periphery of necrosis one finds the tissue infiltrated with the same cells as those which surround the necroses of the liver. The polymorphonuclear leucocytes are perhaps a little more numerous. The pleura over necrosis is partly necrotic, in other places hyperæmic, contains some small hemorrhages. It is covered with a thin layer of fibrin. Between fibrin and pleura in many places a row of swollen endothelial cells is plainly visible. Many minute bacteria in irregular heaps in periphery of necrosis and in embolus in branch of pulmonary artery. No cocci in sections stained with Weigert's modification of Gram's method. The comparatively normal parts of lung show marked thickening of septa, some œdema, a few hemorrhages, proliferation and desquamation of epithelial cells.

Jejunum: Lymphocytic infiltration of mucous membrane, many goblet cells in epithelium, much mucus on surface.

Stomach: Much mucus on surface, no structural changes.

Spleen: Hyaline degeneration of some of the arteries, hyperæmia, fatty degeneration of some of the cells of pulp.

Kidney: A few scattered small areas of chronic nephritis, icteric pigmentation, slight fatty degeneration in spots.

Thyroid: Follicles large, much colloid.

Tonsil: Fatty degeneration of germinal areas of follicles.

Testis: Normal.

Aorta: Slight irregular thickening of intima, with very marked fatty degeneration of connective tissue cells.

RESULT OF BACTERIOLOGICAL EXAMINATION. Cover-slips from abscesses in submucosa of rectum, necrosis of liver and lung show very many minute (largest diameter about 0.85μ) bacteria. They are mostly rod-shaped, but some of them are round, coccus-like. They stain hardly at all with methylene-blue, a little better, often somewhat irregularly, with carbol-fuchsin. Some show polar staining. Some appear as diplobacilli, or, again, as diplococci. In spots they form small clusters; here and there one finds a short thread. They do not stain with Gram's method.

Cultures taken at post-mortem (smear cultures on glycerin agar-agar).

Liver necrosis: two colonies of colon bacilli. Three minute dewdrop-like colonies of minute bacilli. One of the colonies is contaminated with streptococci.

Pus: Abscesses in submucosa of rectum; many colonies of colon bacilli; a few minute colonies like those in culture from necrosis of liver.

Contents of gall-bladder: Two colonies of colon bacilli. Three minute colonies like those in culture from necrosis of liver.

Lung, right lower lobe: Two colonies of staphylococcus pyogenes aureus; one colony of colon bacteria.

Spleen: No growth.

Kidney: One colony of staphylococci; two just visible colonies of streptococci.

The small bacilli that are found so abundantly in the sections and were isolated from necrosis of the liver and suppurating areas of rectum show the following cultural peculiarities:

Glycerin (6 per cent.) serum; no growth. Löffler's serum at 37° C.; after twenty-four hours just visible dewdrop-like colonies appear, which in two or three days grow to about 2 mm. in diameter and become a little more opaque. The centre of the colonies is a little raised and the margin slightly irregular.

Glycerin agar-agar, 37° C.; after twenty-four hours just visible dewdrop-like colonies appear, which later enlarge a little but not very much. They always remain transparent, have slightly irregular margin, raised centre. Macroscopically, and also under the low power of the microscope, they cannot be differentiated from colonies of pneumococci or a delicate growth of streptococci.

Sugar agar-agar; slight granular growth along track of needle; no fermentation.

Beef-tea remains clear; after a few days a little, finely granular sediment appears.

Milk[1] slowly acidified, not coagulated.

Potato: No growth.

Gelatin: No visible growth even after several weeks.

The growth on solid media is quite characteristic in that it forms a delicate grayish-white film that hangs together very tenaciously, so that in trying to remove some of it with the platinum needle, usually the whole colony or larger pieces of it come off. It is also impossible to obtain a good emulsion of them in water. The film, on being rubbed over the cover-slip, breaks up into small fragments, but one never achieves a separation of the individual germs. The just visible grayish-white flakes in the beef-tea are large clusters of bacteria, and show the same peculiarity. The bacteria are non-motile. They have about the same size as those found in the tissues, being, perhaps, slightly larger (about 1μ long). They stain badly with methylene-blue and even with carbol-thionin, well with dilute (1 : 5) carbol-fuchsin. For the periphery of the affected areas in sections and in fresh cultures the staining is more intense and more regular than in cover-slips from the tissues. They do not stain with Gram's method. In cultures not over twenty-four hours old an imperfect staining with the method may, however, be observed in such a way that some of them take the stain quite well, most of them not at all. It always seems to be the largest, best developed individuals that take the stain.

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[1] Could be tried only once on account of dying out of cultures.

Since, as I mentioned above, a true emulsion of them in water is not formed they always appear in cover-slips in the form of clusters in which the bacteria lie very close together, so much so that sometimes it is difficult to see the separating lines between them. They vary considerably in their shape; quite a good number of them appear to be perfectly spherical, others show diplococcus forms, but in all clusters one can find individuals that are decidedly rod-shaped. Threads were not found in the cultures. Here and there one sees individuals that are about twice the normal size, oval in shape, sometimes with slightly pointed ends. These larger forms take the stain very deeply. They are more numerous in old, pure cultures, in which the smaller forms stain hardly at all any more. Spores were not found in any of the cultures. On the culture media they often die out very quickly, but sometimes they remain alive for a considerable time. In one case I succeeded in obtaining a new culture from a culture on Löffler's serum that was about two months old. Naturally, I had to take a good deal of material, and the first growth was not very abundant.

In the sections the bacteria decolorize completely when the sections are treated with either Gram's method or Weigert's fibrin stain. The best results were obtained with sections stained in dilute (1 : 5) carbol-fuchsin and decolorized in alcohol. The bacteria in the periphery of the necrosis and in the tissues next to them have very much the same appearance as those in the pure cultures. Short threads, however, are quite frequently seen. Other bacteria could not be found; there were especially no cocci to be seen in sections from rectum, liver, and lungs, which were stained with Gram's method.

The following animal experiments were made December 20, 1900: Guinea-pig. Subcutaneous injections of about ½ c.cm. of a suspension of a culture on Löffler's serum in a little beef-tea. No swelling or redness observed at point of injection at any time. The guinea-pig was killed February 1, 1901. No lesions were found.

On December 20, 1900, another pig was inoculated intraperitoneally with same amount of same material. No symptoms of disease. Autopsy, February 1, 1901, negative.

January 18, 1901, rabbit. Intravenous injection of about 1 c.cm. of suspension from Löffler's serum culture. No local changes at point of injection. Autopsy, February 1, 1901, negative.

Further experiments could not be made on account of the dying out of the cultures.

Our case, then, is one of primary infection of the rectum with sloughing and ulceration, and secondary infection of the liver by way of the portal system. It is of some interest to note, in the first place, the absence of macroscopical septic thromboses in the hemorrhoidal plexus, and, secondly, the fact that although the infection was very low down in the rectum the infectious material was carried into the portal circulation.

It seems probable that the infection of the right lung is secondary to the septic thrombosis in the hepatic veins, an embolus having been carried away from the latter and lodged in one of the branches of the pulmonary artery.

The infectious agent I believe to be the bacterium which was found in such large numbers in the diseased tissues, and which was obtained in pure culture from the rectum, liver, and gall-bladder.

Animal experiments, it is true, have been so far perfectly negative, but they have not been on an extensive enough scale to prove the absence of pathogenic power in these bacteria for animals, and even if they should be perfectly innocuous to animals we should not be justified to draw the conclusion that this was also the case in regard to man. On the other hand, the relation of the bacteria in the tissues to the lesions is so eminently suggestive that to my mind it almost amounts to a positive proof of their etiological importance in this case. I am not inclined to attribute much importance to the few streptococci that were found in the liver and kidney, because they could not be demonstrated in the sections.

As far as the bacteria themselves are concerned, I have as yet not been able to identify them with any that have been described before. In consideration of their morphology—they being very minute, non-motile bacilli that do not form any spores, and also in consideration of the fact that they do not stain with Gram's method—they would appear to belong to the group of the influenza bacillus. From the influenza bacilli themselves they differ in growing on media that do not contain any hæmoglobin. They also differ in essential details from other members of this group that we find described in Kruse's article on bacilli in Flügge's micro-organisms (third edition, Leipzig, 1896, p. 435, viz.: B. pseudoinfluenza, R. Pfeiffer, *Zeitsch. f. Hygiene und Infectionskr.*, xiii.; B. cavernæ minutissimus, R. Pfeiffer und Beck, *Deutsche med. Woch.*, 1892; B. salivæ minutissimus, B. conjunctivitidis, Gaffky, *Arb. aus d. kais. Gesundheitsamt.*, iii.; B. pseudoconjunctivitidis, B. aeris minutissimus).

There seems to be a very close resemblance between our bacteria and the bacteria that have been described in the sputum in cases of whooping-cough by a number of authors in this country and in Europe. The identity or non-identity of the bacteria found by different authors in this disease has been a matter of much controversy. In reading the reports one certainly gets the impression that all of them have seen the same bacterium in the cover-slips prepared from the expectoration of the patients, whereas, there may be some doubt as to whether all succeeded in obtaining pure cultures of them.

Minor differences, which have played a very important rôle in this controversy, should, however, not be over-emphasized in view of the natural tendency to variation which we observe in all bacteria, especially when they are cultivated on artificial media.

The bacteria described in this paper morphologically correspond in all respects with the photomicrographs of Zusch and Vincenze, whereas they differ a little in their appearance from the photomicrographs of Czaplewski, which, however, as he himself points out, may be due to his having photographed specimens from cultures that had grown on artificial media for long time.

As far as the cultures are concerned, the only essential difference between our bacterium and the ones described in whooping-cough (as far as one is able to judge from the conflicting reports of different authors) seems to be their failure to grow on gelatin, which, after all, may be due to the fact that the gelatin was kept at a rather lower temperature (about 15° C.) than is customary in most laboratories.

Provisionally, I should recommend to call the bacterium described in this paper B. influenzæ similis.

The interpretation of the clinical history is somewhat difficult. It seems certain that when first seen the patient was suffering and had been suffering from an attack of pneumonia, which cleared up within the usual time.

The icterus which accompanied the pneumonia was at the time looked upon as a catarrhal icterus, which was probably correct. At the autopsy there was evidence of an inflammation of the mucous membrane of the duodenum, but no other causes for an obstruction of the bile ducts could be discovered.

The abscesses of the liver show all the characteristics of a very recent infection. It seems very unlikely that they should be three weeks old, and, therefore, we cannot ascribe the jaundice that existed that long, to them, quite apart from the fact that none of them interfered with any of the large bile ducts.

The rectal ulceration seems to have developed insidiously without making any symptoms quite separately from the main disease, and it seems probable that the sudden rise of temperature on December 9th, five days before the patient died, marks the time when the secondary infection of the liver occurred.

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SARCOMA OF THE LARGE INTESTINE.

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Most of the literature on sarcoma of the bowel and all of the statistical papers on the subject have appeared within the last twenty years. It is probable that, as in the case of sarcoma of other regions, notably of the mediastinum, many of the cases of this rare and interesting disease were classified as carcinomata before the era of accurate microscopical diagnosis. A number of papers on the subject have been published within the last two decades, in which the authors have gradually collected from the literature the scattered cases of this affection.

In 1883 A. Debrunner's[1] inaugural thesis was published at Zurich. In 1884 E. Pick[2] published his case. G. Newton Pitt,[3] in 1889, in a report of a case of lymphoid adenoma of the stomach and intestines, published abstracts of eighteen other cases. (These cases would be included by many pathologists under lymphosarcoma, and they are, therefore, referred to in this connection.) In 1890 Ludwig Orth,[4] in an inaugural dissertation, collected eleven cases of intestinal sarcoma, three of which were of the small and four of the large intestine, and four of the rectum.

M. Baltzer's[5] paper, which is so frequently referred to, and which was the most important and thorough study of the subject which had appeared up to that time (or, indeed, up to the present time, if we except the paper of Libman, recently published), appeared in 1892. He analyzed eleven cases from the literature and three cases occurring under his own observation in Madelung's clinic in Rostock. Smoler's[6] paper was published in 1898. Nothnagel[7] has a fairly comprehensive paper on the subject in his *System*, in the volume on diseases of the intestine and peritoneum, and Libman,[8] in his excellent article, which appeared in October, 1900, brings up to date the subject of sarcoma of the small intestine, collecting all the literature which he could find on that subject. In 1900 Blauel's[9] paper also appeared, entitled "Ueber Sarcome der Ileöcecalgegend"—a collection of eight cases, including two of his own.

The operative side of the question of sarcoma of the bowel has been recently dealt with by Van Zwalenberg,[10] who has tabulated fifteen cases of resection of the bowel for sarcoma.

Of the above-mentioned papers Blauel's is the only one which pays especial attention to any portion of the large bowel. To avoid misunderstanding, however, it must be remembered that the subject of sarcoma of the rectum is not included in the above group. The rectum is the region of the bowel which is most frequently the seat of sarcoma. Clinically it can be well separated, as a rule, from what might more properly be regarded as internal sarcoma, and, according to Paneth[11] and Rosenheim,[12] it differs very little in its manifestations from carcinoma of the same region. We have, therefore, excluded it from our consideration.

The opportunity of studying a case of sarcoma of the ascending colon from a clinical and pathological stand-point having offered itself, we have deemed it of sufficient interest, in connection with a report of the case, to collect and analyze as many other cases of primary sarcoma of the cæcum and colon as possible. To this end we have availed ourselves of a number of cases reported in the list of contributions mentioned above, and collected sundry others from the literature at large.

The following is the history of our case:

John C., aged four years, was first seen at the surgical clinic of the Children's Hospital, March 19, 1900. He was referred from the medical clinic, where he had been under treatment for some time. His history was as follows:

Parents both living and in good health. Mother had been very sickly before this child was born. One other child, an older sister, living and well. The patient, a handsome, fair-haired boy, had no sickness of note until about a year ago. He had had an inguinal hernia for two and a half years. One year before, in 1899, while in England, he had been very ill, the exact nature of the malady being obscure, except that he presented a prominence of the abdomen (which is still present), and the physician told his mother that the liver was enlarged. For several months past he has suffered from dyspeptic symptoms, has been losing flesh, and is constipated at times. An examination of the patient showed him to be a rather anæmic child, of normal stature, and not much emaciated. The physical examination gave negative results, until the abdomen was reached. This was prominent, and palpation at once revealed the presence of a rather hard mass occupying the anterior median aspect, apparently filling up the umbilical and epigastric region, and, as far as could be determined, not continuous with either liver, spleen, or kidneys, there being a zone of resonance around it which separated it from the areas normally occupied by these organs. The mass gave the impression of being under or near the anterior abdominal wall, with no intestine separating or coming between them. There were no evidences of ascites.

The diagnosis lay apparently between a tuberculous peritonitis and some form of abdominal tumor. Dr. Samuel Ashhurst examined the case with us, and it was determined to put the child on medical treatment, with the possibility of the condition being a tuberculous one, and to keep him under observation for a time before proceeding to an operation. Inunctions of mercurial and belladonna ointments, equal parts, were ordered, with iron and cod-liver oil internally. The patient was not admitted to the hospital.

A few days later, March 26th, the patient developed a well-marked case of measles, which precluded all thoughts of operation for the time. The urine was examined and found to be negative, the only note being of the presence of abundant amorphous urates. Following the attack of measles, the distention of the abdomen became much greater. On April 1st it was noted that, owing to rigidity of the abdominal walls, the examination of the abdomen was unsatisfactory. There was resonance over the entire surface, and the xiphoid cartilage was pushed forward, protruding beneath the skin.

Following this date a febrile temperature developed, varying from 100.5° to 102.5°, and being highest in the evening. The tympanitic distention of the abdomen became so pronounced as to embarrass respiration, the abdominal walls being rigid, the veins dilated, the umbilicus pouting, but with no ascites. No obstruction of the bowels was present. Food seemed to cause discomfort, and there was evidently abdominal pain or at least discomfort at other times. Enemata of turpentine and the passage of a catheter were resorted to in order to relieve distention, and on April 8th the child passed, after an enema, a piece of fleshy tissue, about four inches long and less than half as wide, which resembled bowel wall, being thick, of fleshy consistence, and dark red in color. Under the microscope it seemed to be composed of fibrin, but, unfortunately, no careful histological examination of it was made.

Following this the temperature remained elevated for about two and one-half weeks, while emaciation became more and more marked, and the difficulty in feeding increased. The distention, which had been so extreme, became gradually reduced, being apparently lessened by the use of inunctions of mercurial and belladonna ointments and the application of a tight binder. The child was very peevish and resisted examination.

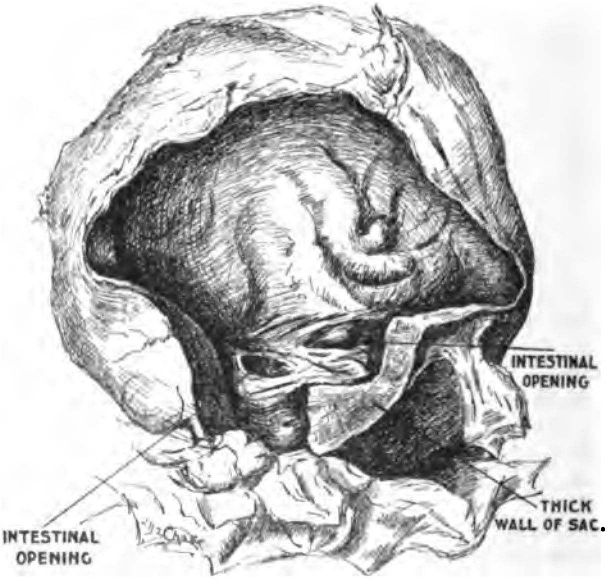
By May 5th the temperature had remained normal for some days, but weakness and emaciation were progressive. He had vomited a great deal for two or three days, and complained of pain at the nape of the neck. There was a somewhat troublesome cough, but no definite pulmonic signs. The bowels moved naturally. There was still some distention of the abdomen at the costal margin, but not much below this. The mass could be again distinctly outlined, but now in the right iliac region. The detection of the tumor had been impossible while the distention was so pronounced.

The child now refused almost all food and medicine. A few days later the left foot and leg became swollen and œdematous, and he developed what the mother described as convulsions—spells accompanied with crossing or rolling upward of the eyes, movements of the arms and legs, and followed by coma. Several of these occurred in the twenty-four hours. Examination of the urine showed only a small amount of albumin. Occasional movements of the bowels were noted. On May 14th, after having vomited everything for some days, and with no new symptoms, he died, apparently of asthenia, being emaciated to the last degree. At no time after the unfortunate attack of measles was he in condition to undergo laparotomy, which both the parents and ourselves looked forward to as offering a definite solution of the diagnosis, and perhaps some hope of relief.

Pathological Notes. The autopsy was performed twenty-four hours after death, and the following notes made:

The body is emaciated in the extreme. Rigor mortis is only partially developed. The left leg, foot, and thigh are moderately œdematous; no scars; slight discoloration in the dependent portions of the body. Incision in the median abdominal line reveals a very slight amount of subcutaneous fat. The incision opens up a cavity in the shape of a sac extending from above the umbilicus nearly to the symphysis pubis. Laterally it extends only slightly to the left of the median line, while on the right it reaches nearly to the anterior superior spine of the ilium. The walls of this sac are adherent to the anterior wall of the abdomen, and at this place are about 2 mm. in thickness. To the right and posteriorly they increase in thickness; the greatest thickness is about 2 cm., being at the posterior portion of the sac. The walls of the sac are composed of a yellowish-white, homogeneous tissue, of rather firm consistency, the external surface being mainly smooth, except in places here and there, especially posteriorly, where it is somewhat nodular. The inner surface is rather granular. The capacity of the sac is about one pint, and at the autopsy it contained about twelve ounces of a turbid, yellowish fluid, devoid of any special odor.

FIG. 1.



Sarcoma of the large intestine, showing aneurismal sac with the intestinal openings on the posterior wall.

On examining the inner surface of the sac the posterior wall is seen to present two openings, which correspond with the entrance and exit of the ascending colon. In the space between these two openings, which is about 5 cm. in length, no naked-eye vestiges of the former bowel can be found, the mucous membrane stopping rather abruptly on the surface of the thickened area at the openings of the bowel. Externally the sac is situated about 18 cm. above the ileocæcal valve, is pear-shaped, the base completely surrounding the ascending colon, and the apex pointing toward the median line. The only attachment of this sac to the parietal peritoneum is in the median line of the abdominal wall along the line of incision. After removal the sac measured 14 cm. in its vertical by 11 cm. in its transverse diameter.

The remainder of the peritoneal cavity in the immediate vicinity of the sac is free from adhesions. From the tumor, along the mesenteric attachments of the bowel, both above and below the sac, there is much infiltration, the mesentery being in places a full centimetre in thickness. The rest of the abdominal cavity seems quite free from involvement, excepting for a false diaphragm which stretches below the liver, stomach, and spleen, forming a separate cavity for these organs. There is an apparent perisplenitis and perihepatitis which attaches these organs to the diaphragm.

The spleen is not enlarged; the capsule is thickened and in places covered with a distinct yellowish-white exudate. The organ is firmly attached to the diaphragm by dense adhesions. On section the surface is brownish-red in color, and slightly fibroid in character.

The liver is greatly enlarged, of soft consistency, and of a bright yellow color. The outer surface is smooth, with the exception of several small areas which present a yellowish-white exudate, and in a few places it is adherent to the diaphragm. On section it is almost bloodless, and of the same bright yellow color throughout. The gall-bladder is normal.

The organs of the thoracic cavity are to all appearances normal, with the exception of one mediastinal lymph gland, which is distinctly enlarged, and on section is homogeneous, of a yellowish-white color, and of rather firm consistency. There is also a slightly enlarged lymph gland on the thoracic side of the right half of the diaphragm. The lungs show hypostatic congestion, but no evidence of tubercle or new growth.

The kidneys are very much enlarged, the left, which is the larger of the two, measuring 10 cm. in length by 5 cm. in width, and 4½ cm. in thickness. The capsule strips easily. They both present a slightly lobulated appearance, with irregular nodular prominences, of a yellowish-white color. The superficial vessels of the cortex stand out quite prominently on this yellowish-white background. On section the surface presents yellowish-white areas, especially prominent in the cortex; these areas are diffuse in places, and in other parts distinctly circumscribed. There are no areas of softening, and the bloodvessels, especially of the medulla, are prominent. There seems to be very little of the normal kidney substance remaining.

The suprarenal glands are not changed in appearance. The stomach appears normal. The small intestine is also normal. The cæcum and the appendix are infiltrated, especially along the mesenteric attachment, with a direct continuation of the growth. The retroperitoneal and mesenteric lymph glands are enlarged; some show the yellowish-white appearance so characteristic of the tumor mass, while others are red and soft.

The sac, with the cæcum and ascending colon, and a part of the ileum, were removed intact, as were also pieces of the liver, spleen, and left kidney, and much of the mesentery, and the enlarged retroperitoneal and mediastinal lymph glands. They were fixed with Müller solution, formol, etc., for further study.

Microscopical Examination. Sections were made from the thickest portion of the sac at its base; from its thin upper portion; from the posterior wall, including the afferent and efferent openings of the colon; from the appendix, and the lymphatic glands, peritoneal and mediastinal; from the spleen, the kidney, and the liver. Sections from the thickest portions of the sac are covered on the outer surface with peritoneum, and are composed of a reticular fibrous network, aggregated here and there into denser masses of connective tissue. The meshes of this framework are densely packed with small, round, mononuclear cells, the nuclei of which take the stain moderately well and show very distinctly a chromatin network, some also showing evidences of karyorrhexis, and here and there mitotic figures. Surrounding the nucleus is a very small rim of protoplasm. In the denser portions of the connective-tissue framework are bloodvessels of moderate size, with fairly well-formed walls. The rest of the tumor contains small capillaries with distinct walls. Near the inner surface of the sections of the thick portion of the sac are vestiges of smooth muscle fibre, which are only recognizable as bundles in a few places, owing to separation of the individual fibres by the infiltration of the round cells previously described. This area of muscular tissue remaining is quite close to the internal surface of the sac, showing that the mucous membrane and submucosa have sloughed away.

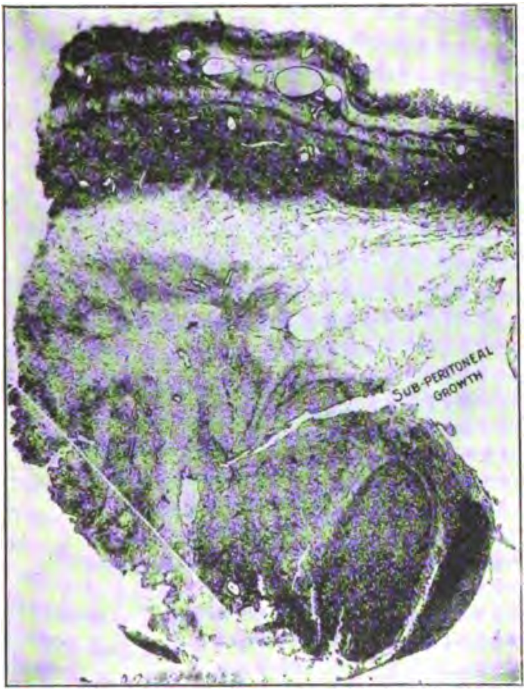
The thin portion of the sac in relation with and adherent to the anterior abdominal wall is covered with peritoneum, and shows itself on section to be composed of two layers—the outer is composed of fibrous tissue, with few nuclei among the connective-tissue bundles; the inner, made up of fibrous tissue infiltrated with chains of the peculiar round cells described. The walls of the bloodvessels here are also well formed. The juncture of these two layers is more or less defined, though in places the infiltration to the fibrous layer is quite evident.

A longitudinal section taken from the posterior wall of the sac, between and including a portion of the afferent and efferent parts of the colon, in connection with the sac, is covered with peritoneum. At each end of this section the bowel is about normal in appearance, excepting for a very slight subperitoneal infiltration of the tumor cells. As we approach the centre of this section, a point corresponding with that portion of the sac between the ends of the bowel, the layers of the intestine become more and more separated, and their appearance altered by the increasing infiltration of the new cells. On the mucous membrane the tubules become shorter and further apart, and, finally, rather abruptly disappear. The muscularis mucosa gradually disappears, but the bloodvessels seem to become more numerous and greatly dilated. In places they have an angiomatous arrangement. The muscular layer, as above mentioned, comes near the surface as the other layers disappear. The individual bundles are greatly infiltrated, so that in the middle of the thickened area only an individual fibre is occasionally seen.

In the region where the sac springs from the colon, and where the tumor infiltration completely surrounds the bowel, the new growth pushes its way between the two layers of the mesentery. Along the cæcum this makes a partial mantle, and on reaching the appendix completely surrounds the entire length of this organ. This surrounding mantle is in places thicker than the intestinal wall itself. The appendix is infiltrated in all its coats, to such an extent in some sections that the normal structure is scarcely to be recognized. In one of these sections an area of degeneration resembling caseous material is to be seen. This is the only area of degeneration found in the tumor.

The lymphatic glands of the mesentery in the region of the tumor are enlarged, of moderate size and consistency, and on section they show a homogeneous structure of whitish color. Microscopically the capsule of the gland and the fibrous trabeculæ show distinct thickening; in places the capsule is distinctly infiltrated with the small round cells, and in some glands there is a mantle of round cells surrounding the gland.

FIG. 2.



Section of bowel wall, with subperitoneal growth.

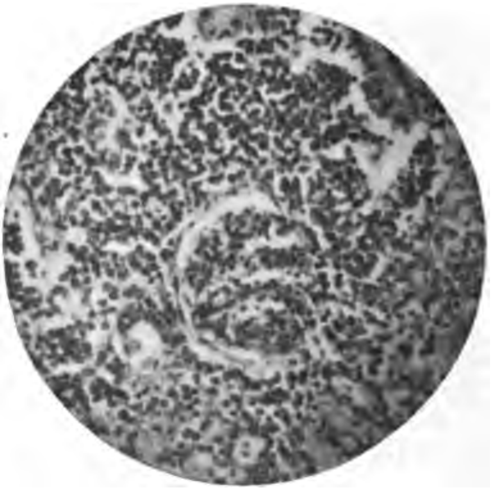
The fatty tissue of the mesentery between the glands shows tracts and heaps of small round cells.

The same structure was observed in the case of the isolated enlarged gland of the mediastinum.

Spleen. The capsule and trabeculæ are distinctly thickened; the Malpighian bodies appear to be slightly enlarged, but they are not distinctly outlined. What was at autopsy thought to be a perisplenititis is found to be a deposit of small round cells similar to those of the tumor.

Kidney. The nodules observed arising from the surface of the kidney are composed of almost pure tumor tissue. They exceptionally show an altered glomerulus, the only remains of the former kidney substance. Between these nodules the kidney structure is more in evidence, although the tubules are separated by the infiltrating tumor cells. The cortex is greatly thickened, this thickening being due to the new growth. The medulla is less involved, and the tubules of the pyramids in many places show only slight changes. The tubules, especially in the cortex, show cloudy swelling, fatty degeneration, necrosis, and in places desquamation of the lining epithelium.

FIG. 3.



Section of kidney, showing glomerulus and infiltrating tumor cells.

Liver. The sections of the liver present a remarkable degree of fatty infiltration and degeneration; in fact, these changes are so pronounced that a normal liver cell can scarcely be seen. Along the interlobular connective tissue, especially surrounding the vessels and ducts, there is a beginning infiltration of the new growth.

Nearly all of the writers on sarcoma of the intestine have prefaced their remarks with comments upon its rarity. Statistical proofs of this are easily found. According to Baltzer,[6] Stort found no cases of sarcoma of the bowel in the records of the Berlin Pathological Institute from 1859 to 1875. Baltzer analyzed fourteen cases, three of his own and the rest collected from the literature. Nothnagel[7] dwells on the comparative infrequency of intestinal sarcoma compared with carcinoma. In the Wiener Allgemeinen Krankenhause, from 1882 to 1893, of 2125 autopsies on cancer cases 243 were of the bowel. Between the same periods, of 243 sarcomata only 3 were of the bowel. He quotes Müller, who found in Berne, of 521 cancers, 41 of the intestine, and of 102 sarcomata but 1 of the intestine, the ileum. Smoler,[6] in fifteen years, from 1883 to 1898, out of 13,036 autopsies found 13 cases of primary sarcoma of the small intestine—a proportion of 1 to 1000. Libman was able to collect about 59 cases in all of sarcoma of the small intestine.

When we compare the relative frequency of sarcoma of the large with that of the small intestine, we find it universally admitted that the latter constitutes the larger class numerically. Disregarding for the present the difference between lymphosarcoma and sarcoma, which, as Nothnagel says, while pathologically distinct, cannot be separated clinically from each other in this locality, we are able to collect the following data: Of 12 cases mentioned by Nothnagel, 1 was duodenal, 3 in the jejunum, 4 in the ileum, 3 in the cæcum, and 1 in the rectum. Nothnagel remarks on the difference between sarcoma and carcinoma of the bowel, the favorite seat of the latter being in the large intestine. This difference is present, he says, at least in the case of lymphosarcoma, to which class 9 of the above tumors belonged. Of Smoler's 13 cases, 2 are included in our list as probably primary in the large intestine, although he includes them in his table of small intestine cases. Treves[13] says that lymphosarcoma is rare in the colon alone, and much more common in the small than in the large intestine. Of 18 cases, in 5 the tumor was located in the stomach, small intestine, and colon; in 1, in the stomach and small intestine; in 3, in the small intestine and colon; in 8, in the small intestine alone, and in only 1 case in the colon alone. He gives the ileocæcal region as a common seat, and states that the tumors grow largest in this locality. Excluding the rectum, he gives the small intestine as the most common site of sarcoma, which, he states, is very rare in the colon. The relative frequency is given by Rosenheim[12] as first in the rectum, and next in the small intestine. Of Blauel's[9] 8 cases of sarcoma of the ileocæcal region we have included 6 in our table as primary in the cæcum. Of 10 cases of sarcoma of the intestine studied by Ablon,[14] 2 were in the large bowel. Libman states that sarcoma by preference occurs in the small intestine, and that in the large intestine (always excepting the rectum) they are much less common, and he quotes Krueger as follows: Of 38 cases, 16 were in the small intestine, 1 in the ileum and cæcum, 2 in the cæcum, 1 in the appendix, 1 in the transverse colon, 1 in the small and large intestine, and 16 in the rectum.

Libman collected 59 cases of sarcoma of the small intestine; we have found in our search but 22 cases of sarcoma of the large intestine. We have analyzed these cases as far as the data we could secure permitted, with the following results:

AGE. The age of the patients ranged from under two years to over sixty. There were seven under ten years; certainly two and probably three between ten and twenty years; four between twenty and thirty; five between thirty and forty; one between forty and fifty; one between fifty and sixty; and one over sixty. The first decade contained the greatest number; the fourth decade the next greatest. There were only three cases past forty years of age.

SEX. The cases were nearly equally divided in point of sex, there being 12 males and 10 females.

LOCATION. Of the 22 cases which we have tabulated as primary sarcomata in the large bowel, in 5 the primary location was open to some doubt, there being, however, a strong probability that it was in the large intestine. In 2 of these there was involvement of the last portion of the ileum. In 1 case—that of Lange—no other part of the intestine was involved, but the growth may have been primary in the ovaries, which were sarcomatous. In 3 other cases, while primary in the large bowel, it involved the ileum by extension. In the remaining 14 cases the large bowel alone was the seat of the sarcoma. When we study the location of these tumors more in detail we find that in 7 cases they were confined to the cæcum (including with it the ileocæcal valve and the appendix); in 5, the cæcum and the ileum were affected; in 3, the cæcum and ascending colon; in 4, the transverse colon; in 1, the descending colon, and in 2, the sigmoid flexure. The cæcum is thus seen to be the most common seat, the next in frequency being the cæcum and ileum; the ileocæcal region comprises the seat of 12 out of 22 cases, or 54.5 per cent. The transverse colon stands next, being the primary seat in 4, or 18.1 per cent.

SIZE. In 8 the size was not stated; in 1 it was said to be the size of a man's head, while in 3 it was the size of a child's head; in 1 it was compared to a cricket-ball. Briefly, the tumors ranged in size from that of a hen's egg to that of a man's head. In one case the growth was in the form of a ring (causing partial obstruction).

VARIETY. In tabulating the tumors from the morphology of the cell we have preserved separate columns for small round-cell sarcoma and lymphosarcoma, although it is difficult to make any definite boundary between these two classes. Where the reporters have described them as such, or from their histological examination they have seemed to us to fall in this group, we have included them as lymphosarcoma; where they have been described as small round-cell sarcoma we have classified them under this head. In 2 cases the type of cell was not stated. Of the remaining 20, 10, or 50 per cent., were round-cell sarcoma; 9, or 45 per cent., were lymphosarcomata, while 1 was of the spindle-cell variety.

METASTASIS. Of 19 cases in which the data as to metastasis was given the abdominal lymphatic glands were involved in 13, or 68.4 per cent.; the peritoneum in 5, or 26.3 per cent.; the small intestine (by metastasis, not by extension) in 2, or 10.5 per cent.; the lung in 2, or

10.5 per cent.; the kidney in 2, or 10.5 per cent.; the spleen in 2, or 10.5 per cent.; the liver in 3, or 15.7 per cent.; other glands in 2, or 10.5 per cent.; the epididymis and spermatic cord in 1; the mesentery (subperitoneally) in 1; the orbit in 1, and in 1 case there was a secondary growth in the large intestine. In 1 case there was no metastasis, and of the 3 cases in which the data was wanting 1 *case recovered after operation.*

The abdominal lymphatics are thus seen to be by far the most common sites for the deposit of metastatic growths, with the peritoneum next in point of frequency. Except where the peritoneum is involved by continuity the road of dissemination of the infecting cells is through the mesentery, and this would explain the frequent and early involvement of these glands which was present in many of the cases at autopsy and in those subjected to radical operation.

ETIOLOGY. The etiology is as obscure as is the case in internal malignant diseases elsewhere. In at least two of our cases there was a strong family predisposition to malignant disease, and there was a history of abdominal traumatism of doubtful influence in two others. Flexner[15] and Libman[8] have called attention to peculiar bodies which they detected in sections from lymphosarcomata of the stomach and small intestine, which they regarded as possibly standing in the relationship of causative organisms.

ORIGIN OF TUMOR. The place of origin of the above tumors is rather difficult to locate on account of the size of the tumor and the involvement of the bowel when the subject presents itself either to the operator or to the pathologist; but from the data of the microscopical examination of the tumors which we have been able to collect, and from the careful examination of our own case, it seems to us that the mucosa or submucosa is the starting-point of these tumors, and, from the normal histology of the intestine, either may be the origin if we take for granted that they have their origin in the lymph follicles. From the mucosa or the submucosa they involve the other coats—the muscular offering the greatest resistance, and, though always infiltrated, traces of this layer are usually found, sometimes as the only remains of the former gut. The subserous coat, from its position, offering very little resistance, we find the greater mass of the tumor usually between the peritoneal covering and the remains of the muscular coat. The serosa itself is rarely perforated. This corresponds with what Baltzer pointed out years ago as the behavior of these tumors in the small intestine. The absence of stenosis and the frequent occurrence of dilatation, sometimes even aneurismal in character, as in our own case, has been explained in the small intestine by the early infiltration and paralysis of the muscular fibres, and the consequent dilatation by accumulation of feces. However, the early involvement of the submucosa, with its plexus of nerves, must not be forgotten as a potent factor in this dilatation.

The *alterations* produced in the segment of bowel involved may be classified as, first, involvement of the whole circumference of the bowel in a rather limited space, forming a rounded tumor with or without dilatation of the lumen. This is the most common condition. The dilatation may be actually aneurismal in extent, due to stretching of the infiltrated wall or to extensive ulceration and breaking down of the interior of the tumor. In about 20 per cent. of these cases the tumor was situated only on one side of the gut. Again, the bowel may be converted into a thick-walled tube, the infiltration extending over a considerable distance in the bowel. In the transverse colon the tumor tends to proliferate in the great omentum, the bowel losing itself in the mass. In only one case was the tumor of the narrow, ring-shaped, stenosing type often seen in carcinoma.

DEGENERATION. The common degeneration of the tumor consists of ulceration of the mucous membrane over the tumor mass, softening within the tumor mass, and subsequently cavity formation. This softening may lead to perforation, with direct communication to the peritoneum, and suppurative peritonitis (in one case purulent peritonitis was found without discoverable perforation), or perforation may follow adhesion between the tumor and loops of the small intestine, as in Blauel's second case (No. 18).

SYMPTOMATOLOGY. In 5 of the 22 cases little or no clinical history was obtained from the sources at our command. Emaciation was mentioned as being present in 11 cases; in 10 it was not mentioned; in 1 case it was not present. It is thus seen to be a frequent symptom, as might be expected from the nature of disease. In our case, as in several others, it was extreme. In the case in which it was not present death was due to septic peritonitis, and not to cachexia and exhaustion, which are common causes of death.

FEVER was present in 9 cases, usually a moderate elevation, especially noted before death. In 1 case, in which there was a secondary infection (probably with the bacillus aërogenes capsulatus and another organism), there was high fever, running up to 104.4° F. for the last four days of life.

ŒDEMA of both lower extremities was present in 1 case, and of the left lower extremity in our own. Pressure upon the iliac veins might, with general weakness and position, be considered as the cause. Ascites was very rarely present.

TUMOR was detected in 16 cases. It was not detected in 2, not noted in the history in 3 (although 2 of these were operated upon), and in 1 no data were obtainable (Hoffmokl, Case No. 21). The presence of a tumor is thus seen to be a most noticeable symptom.

The *locality* in which the tumor was detected during life varied considerably. In 7 it was outlined in the right iliac fossa, in 1 of these cases there being two other tumors in other localities. In 2 it was primarily in the median umbilical region, one of these later shifting to the right iliac fossa, and the other extending over the greater portion of the abdomen. One was in the epigastric region, and four were situated to the left of the median line, one being in the left umbilical region, one in the left hypogastric region, and two in the left hypochondriac and left lumbar regions. The frequent presence of the tumor in the right iliac region corresponds with the frequent ileocæcal location of the growth. In all of the 7 cases in which the tumor was observed to be situated here, the ileocæcal region was found to be the site of the tumor, with one exception, that in which two other tumors were detected during life, in which the transverse colon was the primary site, and in which there were numerous metastatic growths. The next most common location was to the left of the median line. Of the 2 cases observed in the left umbilical and hypogastric regions, 1 was of the transverse colon, and 1 of the sigmoid flexure. Of the 2 in the left hypochondriac and lumbar regions, 1 was a cæcal tumor with intussusception of the ileum and cæcum into the colon, and one was of the sigmoid flexure. The epigastric tumor sprang from the ileocæcal region of the bowel, and here, also, there was intussusception. Of the two in the umbilical region, one—our own case—was of the cæcum and ascending colon, which afterward shifted to the right iliac region, and one was a tumor of the transverse colon. The sarcomata of the cæcal region of the large intestine are thus seen to be usually observed in the corresponding area of the abdominal surface, but may be detected in the median line, or, where there is an intussusception, in the epigastrium or left hypochondrium and left lumbar region. Tumors of the transverse colon usually occupy a median position, sagging downward; tumors of the sigmoid may be looked for to the left of the median line.

In the majority of cases in which the clinical symptoms were given the tumor was described as hard, sometimes of a smooth and sometimes of a nodular feel, rounded or flat, and in two cases there was a sense of fluctuation elicited on palpating it.

Mobility. It was more than twice as often stated to be movable as immovable, and in two cases it is noted that it moved with respiration. The liver was sometimes displaced.

The tumor was frequently found to be tender on palpation.

GASTRO-INTESTINAL SYMPTOMS. These were mentioned in 14 cases or 63.6 per cent. They were mainly pain, anorexia, and vomiting. Pain was present in the majority of cases; in fact, in only one was it stated to be absent. Several other incomplete cases made no reference to it. In 3 it was increased on taking nourishment, and in 1 during urination. It was twice the first symptom noticed, and it was often severe, periodical in some, acute in some, and colicky in others. It was always referred to the abdomen, but not always to the tumor.

In 3 cases it simulated appendicular pain in character and location, and in these cases the tumor was in the ileocæcal region.

Other occasional symptoms were: bloody stools, 3 cases; diarrhœa, 2 cases, and general dyspeptic symptoms were present in 9.

OBSTRUCTION. The absence of obstruction in the large majority of cases is one of the striking characteristics of this form of malignant disease of the large bowel, and is a characteristic which it shares with sarcoma of the small bowel, and which separates it sharply from carcinoma of the same locality. It was certainly absent in 13, or 59 per cent., and it was not noted in the history, and, therefore, probably absent in 6 cases. It was complete in 1 and incomplete in 1, and in 1 the clinical history was not obtainable. In 1 of the 13 cases obstruction was present once during the course of the disease, from twisting of the tumor, as the symptoms disappeared after manipulation; hence obstruction in its truest sense did not exist in this case.

In the case of complete obstruction (Horn) the seat of the tumor was in the descending colon. It was the only case of the spindle-cell type, and the obstruction was due to almost complete stenosis, with impaction of a small fecal mass. In the case of incomplete obstruction, one of Debrunner's (Case No. 4), the tumor was a ring-shaped, round-cell sarcoma of the sigmoid flexure. Thus the only tumors producing obstruction were located in the descending portion of the large bowel.

Obstruction in this class of tumors involving the small intestine has always been due to intussusception, volvulus, or adhesions. In two of our series of cases *intussusception* was found (both tumors of the ileocæcal region), and in neither did it cause obstruction.

DISTENTION. While not a constant symptom this was observed quite frequently, being especially noted in eight cases, often in a marked degree; in one case only was it due to obstruction.

APPENDICITIS SIMULATED. In Libman's paper on sarcoma of the small intestine he reports five cases, in three of which the clinical picture was very similar to that considered diagnostic of appendicitis. He lays much stress on this important clinical observation, and remarks that in attempting to ascertain whether such resemblance had been noticed before he found that the clinical picture was an unknown one. He is not the first, however, to call attention to the fact that sarcoma of the bowel may closely simulate appendicitis. Orth,[4] in 1890, in speaking of the diagnosis of sarcoma of the intestine, dwelt upon the difficulty in separating some cases of typhlitis and perityphlitis from it. Wharton,[16] in 1892, published a paper entitled "Sarcoma of the Cæcum Simulating Appendicitis," and in the case he reported exploration was necessary to differentiate between these conditions (Case No.

11). He personally narrated to us the history of another case, in which the resemblance was as striking (Case No. 12). In one of Blauel's cases, also, is an attack of supposed appendicitis noted as preceding the discovery of the tumor. The fact that the appendix is very often the seat of infiltration in ileocæcal growths may be partly responsible for the symptoms.

There are practically no data in the cases which we have collected in reference to the condition of the blood, although the patients were often said to be anæmic. One case (Fisher, Case No. 19) gives the blood examination three days before death: Hæmoglobin, 50 per cent.; no poikilocytosis or leucocytosis. There is a similar lack of data in the urinary examinations. In our own case albumin was noted late in the course of the disease. In Baracz's case blood cells and blood casts were present in small quantity, without involvement of the kidney. In two cases the urine was normal.

SECONDARY INFECTION. In Fisher's case, where the sarcoma was located in the cæcum, the patient, a male, aged twenty-eight years, first detected the tumor three weeks before admission to the hospital. One week later he developed abdominal pain, followed by swelling of the gums and bleeding, and later by the appearance of a purpuric rash liberally scattered over the front of the body and the neck and arms. Epistaxis was present. The blood showed 50 per cent. hæmoglobin, and no leucocytes or poikilocytes. There was irregular fever during the three days he was under observation in the hospital. He died, and at the autopsy the subcutaneous tissues, especially of the neck and scrotum, and the peritoneal cavity, were distended with gas; and there were small gaseous cysts scattered thickly through the tumor and the spleen, and present in the liver, and to a less extent in the kidney. Aërobic cultures were sterile; anaërobic not made. Microscopically many bacilli were found in the growth among the sarcoma cells around the cysts, often in pairs, and showing a clear space—probably an unstained capsule—around each bacillus. He regarded this germ as probably the bacillus aërogenes capsulatus, and the infection was probably a mixed one. He refers to the case of Hilton Fagge as showing the association of sarcoma with purpura. He thinks the sarcoma acts by lowering resistance and, at the same time, providing a portal of entrance for the germ. Hilton Fagge's[17] case was one of sarcoma of the end of the ileum and the ileocæcal valve, and the symptoms bore a striking resemblance in some points to those of Fisher's case just described. It is not included in our list of cases. The symptoms were entirely those of secondary infection. After some exposure the patient suffered for several weeks from scattered pains in some of the joints, especially the hips and shoulders, without effusion, and had fever and acid sweats. When admitted to the hospital about a month later he was supposed to have rheumatic fever. He then developed a purpuric rash, with hæmaturia, great swelling of the eyelids and scrotum, and ecchymosis of the conjunctivæ. Nodules appeared at the sites of some of the purpuric spots. After death, about two months after the onset of the symptoms, decomposition rapidly set in, and sixteen hours later, at the time of an autopsy, was quite advanced. The scrotum, thighs, and upper arms were emphysematous. The nodules in the skin proved to be sarcomatous.

DURATION. It is difficult to estimate the duration of the disease in this class of cases, as in all of internal malignant disease where the history and the symptomatology have to be depended upon, for the new growth is undoubtedly present for some time before the patient or the physician discovers it. Hence the duration can be estimated only from the time of onset of the symptoms. In the cases not subjected to radical operation, the duration of life varied from one to eighteen months; in the cases in which a radical operation was performed, the duration of symptoms varied from one week to five years before operation, although in the latter case the tumor had been observed for only eight months. One case not operated upon gave no definite symptoms until obstruction developed a few days before death.

The usual causes of death in non-operative cases were cachexia and exhaustion. These were noted in at least six cases—in one, associated with recurrence after the operation. In another case with wide-spread metastasis the cause of death was given as heart failure; this was also probably due to exhaustion. Two cases died of purulent peritonitis, probably due to infection from the bowel; in one of these cases there was incomplete obstruction. One case died of acute obstruction, and another from mixed infection (purpura hemorrhagica).

Fourteen of the 22 cases were subjected to operation. In 4 cases the scope of the operation was purely exploratory, no attempt at removal being carried out. In 10 cases resection of the bowel was performed; 5 recovered from the operation, and 5 died as a result of it—a mortality and recovery rate of 50 per cent. each. Of the 5 cases that recovered 1 died of recurrence after forty-seven days. In 1 no data, beyond the fact of recovery, were attainable; 1 was well after six months; 1 after seven months; 1 after three years. The last case (Orth's) had been operated on five years previously for sarcoma of the ovaries; while the growth in the bowel may have been secondary to that in the pelvis, extirpated five years before, it is included here because of the length of time intervening, and because no other portion of the bowel was affected. In at least 4 of the 5 successful cases enlarged lymphatics were removed from the mesentery; and the fact that these cases recovered shows that the prognosis need not be bad on this account alone, and also the advisability of searching for and removing them.

DIAGNOSIS. The diagnosis of intestinal sarcoma, as of all intra-abdominal tumors, is a matter of much uncertainty. As Osler says, it is here that Bishop Butler's maxim that "probability is the rule of life" finds true application. Of 14 of our cases in which we have recorded the diagnosis made before operation or autopsy, in only 2 can the tumors be said to have been fairly accurately localized; in Bouilly's case a diagnosis of malignant tumor of the intestine having been made, and in Orth's, one of mesenteric tumor. They were taken for tumors of the kidney, the omentum, the ovary, the peritoneum, the lymphatic glands, and in two cases they strongly simulated appendicitis—an observation of considerable importance. Again, the presence of metastasis to the lymph glands and the peritoneum may give rise to the presence of multiple tumors, which may be very confusing. We will briefly summarize the prominent symptoms presented in our cases, and then compare them with those offered by sarcoma of the small bowel and by carcinoma of the intestine.

The primary symptoms are gastro-intestinal manifestations of a dyspeptic type, especially abdominal pain, anorexia, and vomiting; progressive, rapid emaciation; moderate fever; abdominal distention, usually without ascites, but occasionally associated with œdema of the lower extremities; and the presence of a tumor, which is more often movable than immovable, frequently tender, usually of firm consistence, and often located in the right iliac region. The absence of obstruction in the great majority of cases is of great significance. The above chain of symptoms occur in persons of any age, but with greatest frequency in those under forty years, and with relative frequency in the early years of life. The group of symptoms cited does not differ materially from that associated with sarcoma of the small intestine, except, perhaps, the more frequent location of the tumor in the right iliac fossa in disease of the large intestine, owing to the frequent location in the cæcal region. The tumor may be very tender in the case of the large intestine, in which it probably does not differ from some cases of tumor of the small bowel, which in the majority of instances, however, are said to be slightly or not at all tender. Both are liable to be complicated by intussusception. König[18] believes invagination in intestinal tumors to be more common than is usually supposed, citing two cases in discussion.

Libman's statistics show that in the small intestine sarcoma may be found at all ages, although a large percentage of his cases were past thirty. A peculiar paleness or lividity of the complexion has also been described as rather characteristic of cases of sarcoma of the small intestine by both Baltzer and Libman. The differential diagnosis between this tumor of the intestine and carcinoma of the bowel, as well as between it and other intra-abdominal tumors, will, of course, arise. The first question is the only one we need refer to here. Baltzer laid stress on the age, sarcoma occurring earlier; the more rapid growth of sarcoma; the absence of obstruction, of marked tenderness, and of pain during defecation; the early appearance of cachexia and the much greater prominence of general over local symptoms. Libman believes carcinoma of the bowel to be more common than Baltzer supposes in early life, but grants that under fifteen years the chances are in favor of sarcoma; he dwells on the absence of external glandular involvement, the absence of tenderness, and the large size of the growth in cases of sarcoma.

The main points of differentiation would seem to be in a sarcoma of the large bowel, its appearance in the majority of cases in early life (under forty), the early appearance, rapid growth, and large size of the tumor, the quick cachexia, and the absence of obstruction in most of the cases. Pain and tenderness may be present in both; but pain is an early and rather constant symptom in sarcoma of the large intestine, while in carcinoma it does not usually manifest itself until symptoms of obstruction develop.

PROGNOSIS AND TREATMENT. The prognosis without operation is, of course, bad. The life of the patient may be prolonged through a longer or shorter period of suffering, but medicinal treatment of specific nature remains to be discovered. Libman urges the use of arsenic where resection cannot be practised, calling attention to the fact that genuine cases of lymphosarcoma, usually multiple, or of the skin, have been cured by its exhibition, either internally or by injection. We know of no cases of intestinal sarcoma so relieved. The same is true of the use of Coley's fluid. On the other hand, operation, with resection of the growth, offers a fair chance for recovery in cases taken sufficiently early, the prognosis being at least as good, once the tumor can be safely removed, as in sarcoma elsewhere. It is contraindicated in cases far advanced in cachexia, which would be unable to stand the shock of operation, or where there is any other reason to believe that the widespread metastasis so characteristic of the later stages is present. In cases seen early, and in doubtful cases, exploratory laparotomy should be undertaken; 14 out of our 22 cases were operated upon. In 4 the operation was simply exploratory, no attempt being made to remove the tumor. In 10 cases resection was practised; 5 of these died as a result of the operation, either of shock or of peritonitis. Of the 5 that survived the operation, 1 died in forty-seven days of recurrence. Here, certainly, some metastatic growth had been present and not detected at operation. Of the remaining 4 all were living at the time of reporting. This was six months later in 1 case, seven months later in 1, three years in 1, and not stated in 1. In at least 4 of these 5 cases, as has already been remarked, enlarged mesenteric glands were removed at the operation, showing that the presence of metastasis to the lymphatics is no contraindication to operation, and also the necessity of searching for these glands and removing them, if a radical operation is to be performed.

TABLE OF CASES.

Reporter.	Sex and age.	Variety.	Location.	Duration.	Metastasis.	Operation.	Remarks.
1. H. Arnott, Trans. Path. Soc. London, 1874, xxv.	M. 4 yrs.	Lymphosarcoma (lymphoma).	Transverse colon.	A little over 2 months.	Mesenteric glands, kidney, liver, epididymis, spermatic cord, skin of abdomen.	None.	Died from purulent peritonitis.
2. W. Horn, Hamburg, 1882, quoted by Orth, loc. cit.	F. youth.	Spindle-cell sarcoma.	Descending colon; stenosis of gut.	Unknown; no symptoms before obstruction developed.	Not stated.	None.	Death from acute intestinal obstruction due to stenosis of intestine.
3. A. Debrunner, Inaug. Dissert., Zurich, 1883, quoted by Orth	M. 5 yrs.	Round-cell sarcoma.	Transverse colon.	About 7 weeks.	To omentum, whole abdominal cavity seem'd filled with white or pale red tumors.	None.	Death from exhaustion.
4. A. Debrunner, loc. cit.	F. 16 yrs.	Round-cell sarcoma.	Sigmoid flexure. Some stenosis.	4 months.	Retroperiton'l glands, left ovary, apex of left lung.	None.	Death from peritonitis.
5. H. Beck, Zeitschr f. Heilkunde, 1884, v. p. 442.	F. 59 yrs.	Lymphosarcoma.	Cæcum and ileum.	Not stated.	Cervical lymph gl'nds, both lungs, encroaching on pleura and pericardium, spleen, stomach, ileum, and mesenteric glands.	None.	Diagnosed lymphoma of cervical and abdominal lymphatic glands: death from heart failure.
6. F. Lange. New York Med. Journ., 1886, xliii. p. 199.	F. 32 yrs.	Not stated.	Transverse colon.	Uncertain.	Omentum, mesenteric glands, both ovaries.	Resection of bowel, removal of ovarian tumors.	Primary seat doubtful; possibly in ovary. Death from septic peritonitis on ninth day: leakage probably from incessant vomiting.
7. Bouilly, Bull. et Mém. de la Soc. de Chir. de Paris, 1888, n. s., xiv. p. 601.	F. 44 yrs.	Lymphosarcoma.	Cæcum and ileum.	Symptoms for 5 years; tumor for 8 months.	Lymphatic glands in mesentery.	Resection.	Recovered; well seven months later.
8. L. Orth, Inaug. Dissert., Heidelberg, 1890. "Ueber die Sarkome des Darms, Mesenteriums u. Retro-peritonealen Raums."	F. 34 yrs.	Lymphosarcoma (alveolar)	Transverse colon.	3 months.	Lymphatic glands of mesentery.	Resection (Czerny).	Had ovaries removed for sarcoma five years before; living and well three years later.
9. R. v. Baracz, Arch. f. klin. Chirurg., 1891, xlii. p. 501.	M. 8 yrs.	Round-cell sarcoma.	Cæcum; tumor formed apex of ileocæcal intussusception.	13 weeks.	A nodule in neighborh'd of ileo-cæcal valve.	Lumbar incision; resection of tumor and intussusception.	Diagnosis: malignant growth in a movable left kidney or in descending colon. Death from shock second day.
10. E. Becker, Deutsche Zeit. f. Chirurgie, 1894, xxxix.	M. 35 yrs.	Round-cell sarcoma.	Cæcum.	5 weeks before operation; lived 47 dys. after operation.	Not stated.	Resection.	Recovery from operation; death from recurrence.

Reporter.	Sex and age.	Variety.	Location	Duration.	Metastasis.	Operation.	Remarks.
11. H. R. Wharton, International Clinics, 1894. 4th series, ii. p. 199.	F. under 2 yrs.	Round-cell.	Cæcum.	Sick several weeks before admission; still alive several months later.	To orbit.	Exploratory; portion removed for examination.	Symptoms simulated appendicitis before operation; when reported tumor was growing and orbital sarcoma had developed.
12. H. R. Wharton, personal communication.	M. 21 yrs.	Round. cell.	Cæcum.	About two months.	To peritoneum.	Exploratory.	Resembled acute appendicitis at onset; died of cachexia about six weeks after operation.
13. R. Abbe, Annals of Surgery, 1895, xxi. p. 592.	M. 6 yrs.	Not stated; no microscopical examinat'n	Cæcum and ascending colon.	Symptoms for 1 week.	Mesenteric glands.	Resection.	Death from shock 36 hrs. after operation.
14. C. Levi, Bull. de la Soc. Anat. d. Paris, 1895, lxx. p. 68.	F. 38 yrs.	Round-cell.	Sigmoid flexure.	2 months.	None.	Excision (Tuffier); formation of artificial anus; true nature not diag. until removed.	Death 2 days after operation; fatty liver, weighing 3200 grammes.
15. F. Smoler, Prager Med. Woch., 1898, xxiii. p. 145.	M. 27 yrs.	Lymphosarcoma.	Cæcum, ileum, and ascending colon.	Not stated.	Mesenteric glands.	Resection.	Death 2 days after operation, from septic peritonitis.
16 F. Smoler, loc. cit.	M. 19 yrs.	Lymphosarcoma.	Cæcum and ileum	Not stated.	Peritoneum.	None.	
17. Blauel, Virch. Archiv, 1900, clxii. p. 487.	M 38 yrs.	Round-cell.	Cæcum and ascending colon.	18 months.	Retroperitoneal and portal lymph glands.	Tum. punctured, later incised and drained; opening communicated thro' tum. cavity with bowel	Colon bacillus found in fluid evacuated. Death from exhaustion 4 days after opening.
18. Blauel, loc. cit.	F. 66 yrs.	Round-cell.	Cæcum.	7 months.	Mesenteric and retroperitoneal glands and liver.	Exploratory.	Died 25 days after operation; anastomosis between tumor cavity and two loops of small intestine resembled tuberculous condit'n.
19. T. Fisher, Bristol Med.-Chir. Journ., 1901, p. 29.	M. 28 yrs.	Lymphosarcoma.	Cæcum and ileum.	3½ weeks.	Few small subperitoneal growths in mesentery.	None.	Purpura hemorrhagica; infection by bacillus probably B. aërogenes capsulatus.
20. C. Van Zwalenberg, Journ. Amer. Med. Assoc., March 9, 1901.	M. 5 yrs.	Lymphosarcoma.	Cæcum; partial intussusception of ileum and vermiform into cæcum	5 months.	Mesenteric glands and ileum.	Resection.	Recov.; 6 mo. later was well; mother and paternal grandmother died of sarcoma.
21. Hofmokl, quoted by Van Zwalenberg.	F. 24 yrs.	Lymphosarcoma (adeno-(sarcoma)	Cæcum.	Not stated	Not stated.	Resection.	Recovery.
22. Jopson and White.	M. 4 yrs.	Round-cell.	Cæcum and ascending colon.	Probably nine or ten months.	Mesenteric glands, peritoneum, kidney, spleen, and liver.	None.	Liver large and fatty, with some tumor infiltration.

An operation attended with a mortality of 50 per cent. is a formidable one, and not to be lightly recommended; but when we consider the brief duration of life without it—about five and one-half months being the average in the cases not operated upon—and the fairly good results in cases which survive resection, the operation, it would appear, should be advised when thorough removal seems feasible or likely. The section of the bowel should be made through a healthy area, well to each side of the microscopically diseased portion, in order to get beyond the infiltrating cells spreading, sheet-like, in the submucosa and subserosa. When, on opening the peritoneal cavity, the lymphatics and peritoneum are found extensively involved, and the liver and kidneys large on palpation—and, perhaps, nodular—simple closure of the wound will be all that can be done unless obstruction be present, when the formation of an artificial anus above the stenosed area would be indicated.

Van Zwalenberg,[10] in a study of 15 cases of resection of the bowel in various regions for sarcoma, found 9 recoveries and 6 deaths. Children stood operation very well. Of 5 cases under ten years of age only 1 died.

In preparing our list of cases we have excluded those reported by Perceval,[19] W. S. Thorne,[20] and Djemil-Pacha.[21] In Perceval's case the nature of the tumor is too uncertain to classify it; in Thorne's, from the histological examination, the tumor was probably a carcinoma, and in Djemil-Pacha's case, one of sarcoma of the great omentum and transverse colon, the tumor was probably primary in the omentum.

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ON THE NATURE OF THE DISEASE KNOWN AS ERYTHEMA INDURATUM SCROFULOSORUM.[1]

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THE disease first described by Bazin under the name of erythema induratum scrofulosorum has given rise to a great deal of discussion on the question of its pathology, and the doubts about its nature do not yet seem to be thoroughly dispelled. The report of the following two cases has, therefore, seemed to me to be justified, in the hope that some light may be brought to bear on an important and at present obscure train of symptoms. Before describing the cases upon which this paper is based I have deemed it advisable to sketch shortly the present position of the question. Bazin, the original describer, boldly attributed the disease to the scrofulous diathesis, and added the qualification scrofulosorum to his descriptive name of erythema induratum. The disease, according to him, generally affected young and well-nourished females, and this is a point which I think has, perhaps, too much dropped out of sight. Bazin's original description was rescued from oblivion by Colcott Fox and by Hutchinson, and in the renewed interest taken in the disease the question of the propriety of including it among the tubercular affections was raised.

As far as I know, Audry was the first to attempt to decide this point by excising a nodule from a patient suffering from the disease, examining it histologically, and also inoculating it into the guinea-pig.

His observations showed nothing at all resembling the tubercular structure in the excised portions, nor did his animals become infected with tubercle. The histology, according to him, was one of intense œdema with fatty degeneration, and he made no mention of the condition of the vessels of the part, confining himself to mentioning the relation of the nodules to the sweat-glands. It is worthy of note that the age of his patient was thirty-four years. In the same year Leredde described a case occurring in a woman, aged thirty-six years, from whom nodules were also excised. No inoculation experiments were recorded, but a short histological note was given in which he drew attention to the fact that there was an extreme amount of phlebitis present, but no arteritis. He describes nothing at all resembling the usual tubercular structure, but winds up by assigning the disease to the class now known as the tuberculides.

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[1] Read before the British Medical Association meeting at Cheltenham, August, 1901.

Thibierge and Ravant then described three cases occurring in females, aged twenty-two, twenty-four, and fifteen years, respectively. In all three of these cases the histological appearances were those of tubercle, and in the last two inoculation of tissue into guinea-pigs was performed. The animal inoculated from Case II. (aged twenty-four years) was useless, owing to the fact that it was lost a few days later. Inoculation from the third case gave rise to typical tubercle of the animal, but it may be noted that the patient suffered from undoubted tubercle in one hand.

Since that time Dr. Colcott Fox has had an inoculation made from one of his cases, with a positive result, and other observers have published cases with histological reports showing evidence on both sides of the question. It should be mentioned that the age of the patient from whom Dr. Colcott Fox obtained his material was thirty-five years.

Within the last year it has been my good fortune to be able to observe somewhat closely, in the wards of King's College Hospital, two cases which illustrate two types of the disease, or, rather, I should prefer to say, indicate that two diseases are at present confused under the same name.

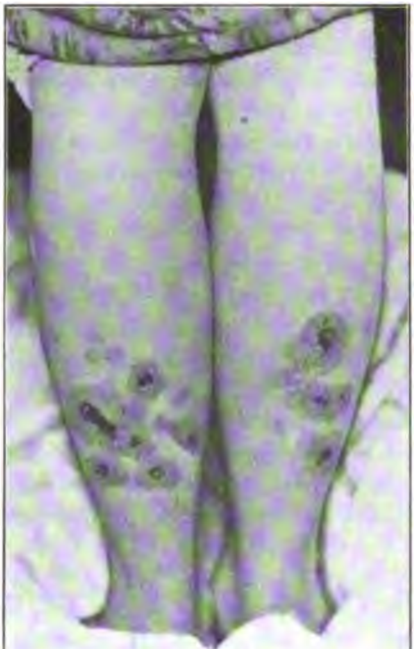
Case I.—A. M. C., aged fourteen years, was admitted into the wards for ulcers of the legs. The patient is one of thirteen children, eight of whom died in infancy of convulsions. The mother has had three miscarriages, but there is no history of syphilis or tuberculosis in the family.

The patient herself has always been healthy, and has never suffered from chilblains. About a month ago she first noticed some small red lumps on the backs of her legs. These were slightly painful and enlarged slowly, finally breaking down into the ulcers that are now seen. Soon after the appearance of the lumps on the backs of the legs she noticed a similar affection on the dorsa of both feet, close to the roots of the little toes. The patient is a healthy looking, well-grown girl, with rather high color and extremely clear complexion. There are no signs of past syphilis, nor, indeed, of any disease at all, past or present, with the exception of that for which she sought relief.

On the backs of the legs there are present several ulcers of varying size and shape (seven on the left leg and four on the right—see Fig. 1). These ulcers have deeply cut, clean margins, and the bases are covered with somewhat hemorrhagic sloughs. On palpation the ulcers are found to be formed by the central breaking down of a large infiltration, the latter being indicated by the dark area in the accompanying photograph. Besides these ulcerated infiltrations there are several small nodules which are scarcely visible, but are very well defined to the touch. They lie deep in the subcutaneous fat and are freely movable over the deeper tissues, but are adherent to the skin. On the dorsum of each foot, opposite the base of the little toe, there is a small ulcer resembling those on the back of the leg.

She was given thyroid colloid in half-grain doses three times a day, and the legs were dressed with yellow oxide of mercury ointment. After eleven days all the ulcers except that on the dorsum of the left foot had cleaned and showed signs of healing, but the nodules did not seem to have altered in any way. Twenty-six days after admission the nodules were rather smaller, but still very definite, and on this day a strip of skin containing two of the largest was excised for me under a general anæsthetic by my friend Mr. Cheatle. Part of this was used for histological examination, and the other part was divided and inoculated under the skin of two guinea-pigs.

FIG. 1.



The wound made in the leg healed by first intention, and in this way two of the most resistant nodes were removed; but the other parts of the skin were very slow in completely resolving, and it was not until forty-five days after admission that the patient left the hospital, completely cured.

The two guinea-pigs inoculated with the material from this case never showed any signs of tuberculosis, a temporary enlargement of glands which occurred within the first fortnight afterward subsiding. One of these animals was killed at the end of a month, and the site of inoculation, together with the glands in the neighborhood and the spleen, were all examined microscopically, but without showing any evidence of tuberculosis.

The histological appearances of the excised nodule will be described with those of the second case.

CASE II.—A. C., aged thirty-seven years, married, was admitted to King's College Hospital, complaining of the presence of painful swellings in the legs. Her family history showed that she had two brothers who suffered from chronic cough, one being under treatment at a hospital for consumption. Her one child is delicate, being subject to tonsillitis. Her own history shows a severe attack of acute rheumatism at the age of fifteen years, since when she has always suffered from dyspnœa on slight exertion or excitement. She has always been of an extremely hysterical nature. The present trouble began nine weeks ago by the appearance of some lumps on the backs of the legs, and soon after a few came on the sides as well. They were very tender even on their first appearance, the pain being of a severe, aching character and diminishing when the feet were raised. The lumps grew in size, but did not increase in number, and she had to lie in bed because of the pain. The result of this was that the swelling went down somewhat, and she was well enough to come to the hospital.

Present Condition. The patient is a slight, pale woman, with a well-marked tendency to acroasphyxia, which she says is worse in the winter. No internal disease is to be detected, but the condition of the heart is, perhaps, not quite normal. The dulness extends superficially up to the upper border of the fourth rib, and the apex-beat is displaced slightly outward. The beat is forcible, but neither diffused nor undulating, and the sounds are loud, but no murmurs are to be detected.

Both legs below the knees are affected by the disease, which is manifest as a series of small nodes which are almost invisible to the eye, being of a faint bluish-pink color, but are obvious enough to the touch, giving the feeling of small tumors about the size of a large pea to a nut, with very indistinct margins. These tumors are deeply seated, but are adherent to the skin and movable over the subcutaneous tissue. On careful examination it can be made out that the nodes lie chiefly over the internal and external saphenous veins, but there are also several which do not seem to bear any relation, at all events, to the larger veins of the legs. Immediately above the internal malleolus on the right leg there is a well-marked infiltration, about one and a half inches in diameter, which appears to be made up by the fusion of several of the smaller nodes, and over which the skin is distinctly reddened, shiny, and œdematous—in fact, looking as if it would readily break down to form an ulcer.

The patient complains of very great pain in the nodes, especially when they are handled or she stands up; in the latter case there seems to be some slight increase of size in the nodes. The contrast between the severe pain in this case with the slight symptoms in Case I. is very marked.

The treatment adopted was simply to raise the legs and wrap them up in cotton-wool. A few days after admission two nodules were excised deeply, the whole of the tissues down to the fascia being included. One of these was used for histological purposes and the other was divided and inoculated by Mr. Cheatle under the skin in two guinea-pigs.

At the end of a week after admission almost all of the nodules had entirely disappeared, and the large area of infiltration had completely subsided, leaving only a discolored patch. The patient only remained in the hospital for twenty-three days, and would not have been so long if I had not wanted to give her a prolonged rest, in order, if possible, to prevent recurrence of the condition. As regards the experimental inoculation, the animals both remained quite well and never developed any suspicious symptoms at all.

It will, I think, be best to describe the anatomy of the two cases together, for the purposes of comparison.

In Case I. the chief situation of the nodule is in the deeper part of the subcutaneous tissue. The infiltration consists of masses of small round-cells distributed everywhere between the fat-cells, associated with a considerable overgrowth of connective tissue. In this connective tissue, which is œdematous, there are occasional foci which bear a strong microscopical resemblace to tubercular nodules, consisting of masses of epithelioid cells and some giant cells. (See Fig. 2). The small veins in this case show in many instances complete obliteration, with endothelial cells, so much so that only on careful examination can they be recognized as veins at all. The arteries show this change to a much slighter degree, if at all, and the sweat-glands, which have been described as being severely affected in some cases, appear almost normal here.

Sections stained by the Ziehl-Neelsen and other methods failed to reveal the presence of any organism.

FIG. 2.

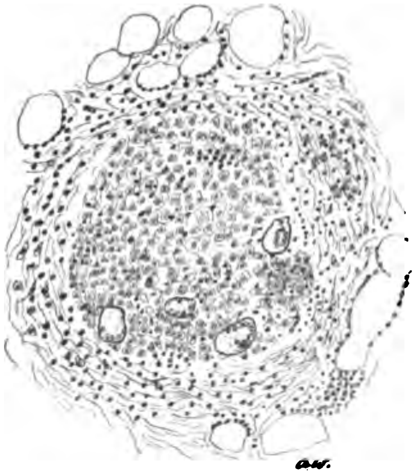


FIG. 3.

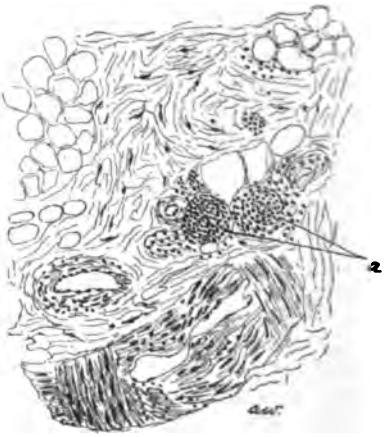


Fig. 2.—The granuloma suggestive of tubercle from nodule in Case I.

Fig. 3.—Phlebitis of venules (*a*) forming the only pathological change in Case II. No granuloma visible anywhere.

In Case II. the chief situation of the changes as regards depth is exactly similar to that in Case I. On microscopical examination, however, one sees at once that the infiltration is much less wide-spread than in the first case, being limited entirely to the neighborhood of a vein and its minute branches. Although numerous sections were examined, there was nothing at all resembling tubercle, or, indeed, any granuloma found in any section. The changes seemed to consist of a chronic inflammatory condition of the walls of the smaller veins, affecting chiefly the media and adventitia by infiltration with small round-cells (see Fig. 3, *a*) rather than by proliferation of the endothelial cells of the intima, as in Case I. No micro-organisms were found in any of the sections after special staining. We have here two cases of somewhat similar history and appearance, except that the second seemed to be associated with more pain, especially on standing, and had not gone on to ulceration.

There are, however, marked differences to be noted, and in the first place I would draw your attention to the fact that in those cases in which histological examination has revealed an anatomy resembling that of tubercle the patients have been young, with the exception of Dr. Colcott Fox's case, in which the age was thirty-five years. In Bazin's description the age is not actually mentioned in years, but he describes it as occurring in young girls. In my first case the age was fourteen years, and the anatomy was that of tubercle. It is true that the inoculation test failed, but there may be two explanations of this. In the first place Dr. Fox has pointed out that these lesions are very rarely if ever progressive, in which case it may be that they are caused in some cases by dead tubercle bacilli, since we know that embolism by dead tubercle bacilli will cause the production of non-progressive tubercles. This, of course, is not always the case, or positive inocula tions would never result. Secondly, there was a long period of rest and treatment before the nodules were excised. This is a lasting regret to me, but was unavoidable, since Mr. Cheatle's license had been allowed to lapse while he was away in South Africa, and we had to wait some time after application before he obtained a new one.

In the light of this point I think we may assume that the first case was in all probability tubercular. The second was certainly not so. No time was lost in obtaining the tissue, and yet there was no result from our inoculations, nor was there the slightest resemblance to tuberculosis in the anatomy of the lesion. The age of this patient is similar to that of Audry's and to Leredde's; and although Leredde considered his case was one of tubercle, he made no inoculations, nor do his own published descriptions suggest tubercle to the reader. The remarkable way in which these lesions in my second patient cleared up on rest alone was totally different from what occurred under similar circumstances in the first case, where the non-ulcerated nodules took weeks to clear up, and also tends to show that we had two different forms of the disease under observation.

The conclusions I would draw, then, are that there are at least two forms of disease to which the name of Bazin's disease has been given. One of these diseases is essentially indolent, chiefly affects adolescent girls, and is in some cases undoubtedly caused by the living tubercle bacillus. The other affects women of middle age almost if not quite entirely—usually those who suffer from some form of cardiac weakness—is more acute, more amenable to treatment by rest in bed, and has nothing to do with the tuberculous process.

A case allied to if not identical with this second condition has recently been described by Philippson under the name of phlebitis nodularis necrotisans. His patient was, however, a girl who suffered with the disease from the age of eighteen to twenty years, and apparently the affection was much more severe than was the case in my second patient. The histological findings were identical in the two cases.

Since this paper was completed a further report of two cases by Professor Mantegazza has appeared. Both his cases were young girls (aged twelve and fifteen years, respectively), and the histology showed a definite granuloma resembling tuberculosis, with great changes in the arteries and veins.

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A CASE OF LUPUS ERYTHEMATOSUS CURED BY THE X-RAY.

By Richard F. Woods, A.M., M.D.,
OF PHILADELPHIA.

I wish briefly to report the following case of lupus erythematosus, which I think is of considerable interest from the fact that it was entirely cured by the application of the X-rays.

I think the rapidity of cure was quite remarkable. The lesion, which had been steadily growing for four years, was entirely eradicated in five exposures to the rays, each treatment lasting ten minutes.

The history of the case is as follows:

M. D., aged thirty-two years. No tubercular history. Four years ago the patient noticed a small pimple on her face, which she constantly irritated with her finger. It steadily increased in size, giving her some pain, and bleeding quite freely at times, and especially worried her in cold weather.

She had been attending clinics in several hospitals in this city for the past two years, and had applied various ointments and had taken medicine internally without success.

She presented herself at my office on July 12, 1901. The growth at that time was about the size of a half-dollar, situated slightly above the angle of the mouth (Fig. 1, which was made at that time). It was of the discoid form, slightly raised, and of a bright reddish color. The centre of the growth was partially covered with scales. The erythematous border was sharply bounded by the skin, and was firm to the touch. There was some alteration in the mouths of the sebaceous glands; the follicular orifices were enlarged, gaping, and filled with hardened sebaceous matter.

I suggested the X-rays, and she was given her first treatment two days later at the Pennsylvania Hospital, with the assistance of Dr. Mitchell. The face was covered with a sheet of lead from which a small V-shaped piece had been removed to expose the growth. This was thought necessary to protect the face from burning. The ordinary Ruhmkorff coil was used, charged from the electric-lighting current, and had the strength of about eleven volts. The current was turned on for ten minutes, and the distance between the face and the tube was seven inches. The treatments were continued twice a week.

FIG. 1.

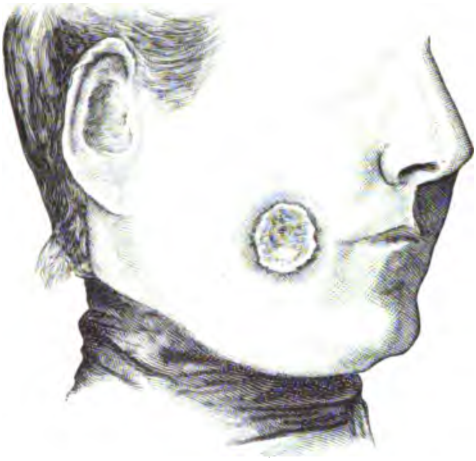
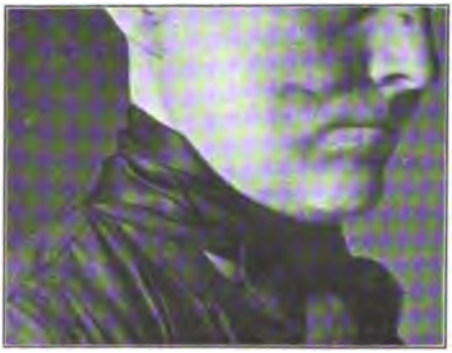


FIG. 2.



When the patient returned for the second exposure the improvement was remarkable. The entire character of the growth had changed. There was a diminution in the color and the prominence of the edges.

The erythematous halo was fading away, and the raised margins had become level with the sound skin, while the central portion was becoming depressed and atrophic. The improvement continued rapidly, and when the patient returned for the sixth treatment it was found unnecessary to continue. The area of ulceration had entirely healed, and was covered with a healthy cicatrix. The photograph (Fig. 2) was taken a few days after the last treatment, and shows the appearance of the scar over the original site of the lupus. Through trouble with the camera we were unable to get a good picture of the patient before the treatment was started, but the drawing shows fairly well the size and condition of the growth.

The rapidity of cure in this case of tubercular disease of the skin (although some authorities doubt the tubercular nature of lupus erythematosus) is very satisfactory, and, with the other cases that have been reported, would warrant a broadening of the field of experimentation with the X-rays in other tubercular affections.

A CASE OF LYMPHATIC LEUKÆMIA, APPARENTLY DEVELOPING OUT OF HODGKIN'S DISEASE, ACCOMPANIED BY LEUKÆMIC LESIONS AND PIGMENTATION OF THE SKIN, CULMINATING IN STREPTOCOCCUS INFECTION.

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(*From the Pathological Laboratory of the University of Buffalo.*)

Summary of Chief Points. *Hodgkin's disease, first shown by physical and blood examinations; lymphomata in the skin, the first evidence of the disease developing where lymphoid tissue does not normally exist; subcutaneous and internal hemorrhages; spontaneous increase and reduction of tumors, characteristic of Hodgkin's disease; suddenly developing clinical and blood changes, showing transition from pseudoleukæmia into true lymphatic leukæmia; terminal tonsillar infection, resulting in general sepsis, with disappearance of blood picture of lymphatic leukæmia; subsidence of lymph nodes and spleen during infection.* *Personal History.* The patient, J. B., aged twenty-six years, first seen on April 26, 1900. His father died at the age of fifty-eight, presumably of some malignant disease of the bladder, and his mother at the age of forty-eight of inflammation of the bowels. His four brothers and one sister survive him, and have always had excellent health. To his knowledge none of his relatives, near or remote, ever suffered from his particular complaint or from any cutaneous affections. His habits were never vicious, he was never affected by syphilis.

Previous History. No assignable cause for patient's condition. It began with a slight induration of the epidermis and its underlying structure over the left temple, midway between the eyebrows and the margin of the scalp, first accidentally observed by the patient December

1, 1899, five months before he came under my notice. At first this increased very slowly, afterward more rapidly. For two months it was confined to the initiatory seat, during which period it attained the size of a twenty-five-cent piece. The patient then consulted a physician, who pronounced the lesion syphilitic gumma, and prescribed accordingly; as, however, under this treatment, there was no improvement, electrolysis was resorted to, which only served to stimulate the growth. A circumscribed hardness now became apparent in the centre of the cheek on the same side, though deeper in the cutis, and without change of coloring in the integument, the parts losing their suppleness. The patient experienced a hide-bound sensation whenever the jaw was moved. This manifestation, beginning on the left side, was irregular in outline, with a mean diameter of about five centimetres.. The lymphatic nodes were enlarged from the moment of its inception, first in front of the ear, and subsequently involving the post-auricular, which became intensely painful. Later the inferior maxillary, and finally the cervical were affected, the latter attaining a considerable size. The accompanying pain and soreness were of short duration.

On February 20th a number of superficial, irregular, yellowish-gray spots were detected over the region of the sternum, while at the same time a slight infiltration manifested itself in close proximity to the left nipple, which increased with amazing rapidity. Other areas appeared correspondingly distributed over each side of the chest and back. These discolorations were of varying sizes and shapes, but their borders were well defined. As a sequence of this general dissemination, there ensued an enlargement of the lymphatic glands of the axillæ, which were more or less tender upon palpation. Apart from the slight tenderness of the glands, the patient suffered no inconvenience. Appetite good, habitually slept well, and continued to apply himself to heavy manual labor.

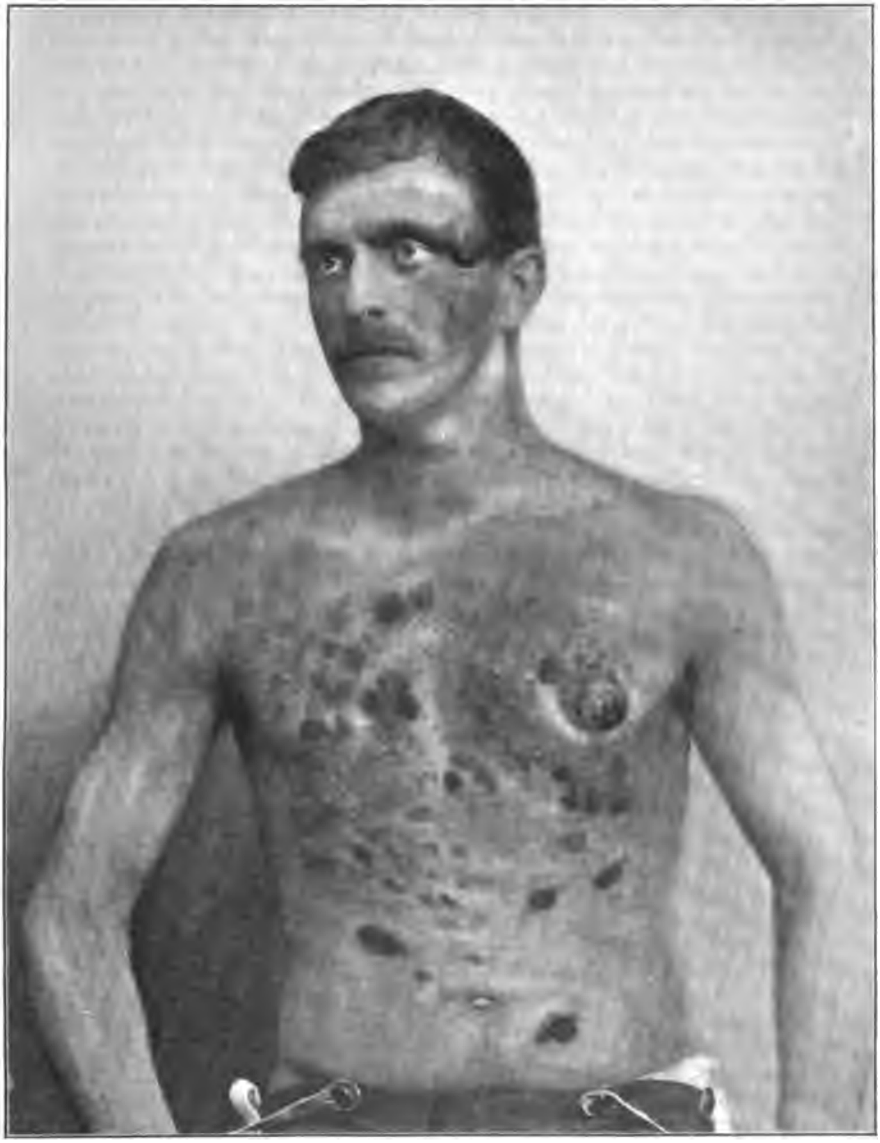
Examination of the Patient. Upon his arrival at Buffalo he was examined by Dr. Charles G. Stockton, who pronounced his organs healthy. No enlargement of the spleen discoverable. The examination of the blood, which was made by Dr. Albert E. Woehnert, showed at this stage no marked alterations, being as follows:

Erythrocytes	5,128,000
Leucocytes	4,000
Hæmoglobin	88 per ct.
Lymphocytes (small)	27 "
Lymphocytes (large and transitional)	4 "
Polymorphonuclear neutrophiles	68 "
Eosinophiles	1 "

In counting the leucocytes, microcytes and microblasts were occasionally discovered. The red corpuscles were apparently somewhat irregular and pale. The urine had an acid reaction; specific gravity 1020; urea and uric acid slightly augmented; sugar and albumin absent; no casts or leucocytes, and but few crystals of uric acid.

The illustration of the case here presented was taken but a few days prior to the clinical record. It fairly demonstrates the topography of the multiple formations. The general tint of the skin was ruddy, as though sun-burned, while the areas upon the chest were as brown as burnt sienna—faithfully reproduced by the artist. The initial lesion, situated on the left side of the face, occupying the upper part of the temporal, the lower part of the frontal, and the exterior half of the supraorbital regions, formed an oval protuberance, with its long diameter extending from a point beneath the eyebrow to a point beyond the hairy portion of the scalp, where the individual hairs were raised like the spines of a porcupine. Its greatest length was nine and its greatest width ten centimetres. It was non-adherent beneath, sliding readily with the skin; the border was well defined and its dusky hue was without transition or the slightest erythematous tint, which was in keen contrast with the normal epidermis. The whole growth was hard and elevated above the contiguous skin. The entire surface was not only distinguished by its cyanotic tinge, but by numerous vibices, some in streaks, others cruciform. In the profile of the right eyebrow were two definite nodules, about the size of a pea, freely movable and in keeping with the normal color of the skin.

The centre of the left cheek bore a deep-seated infiltration of three and one-half to four centimetres in diameter, presenting an unaltered hue, except at the centre, which bore a tawny shade. The face lesions were four in number; the scalp was in nowise involved. Seated upon the body over the sternum were two lesions, each measuring ten to twelve millimetres. The infiltration of the upper one was invariably thin and invested with a yellow pigmentation. In the lower one the infiltration was more pronounced and its circumference more definite; it presented a bluish hue and showed a number of minute red spots, more or less irregular in contour. In the left inframammary region, approaching the mesial line, were two spots about the size of a filbert, covered with normal skin, and deeply seated. On the left breast a large patch had formed around the nipple, similar to that situated on the temple. The areola of the nipple had disappeared. The surface of this patch was greatly elevated, and was oval in outline, with a long diameter of ten centimetres, quite hard, easily displaced, and more or less reticulated except at the centre and lower edge, which were shrouded with vibices. Situated on the lower portion of the abdomen were seven distinct and deeply-seated nodules, varying in size from a pea to a hickory-nut. In four the skin color was unaltered. The largest, and the one first developed, was of a cyanotic character, covered with a brown pigmentation. The peculiar features of all the lesions are not visible in the photographic reproduction, owing to the fact that they were so deeply embedded, without apparent change in the epidermis. The whole chest and back were mottled, showing numerous, well-defined pigmentary stains, and variegated blotches of different shapes and sizes. There must have been forty or more upon the anterior surface of the trunk, and nearly as many upon the posterior. These differed in size from a pea to a twenty-five-cent piece, and in some localities coalesced. They usually presented a circular form. This was especially true of the large ones—the smaller were frequently misshapen, sometimes grotesque. The prevailing color was a chocolate yellow. Barring the discolorations, the epidermis was seemingly normal. There was a decided hypertrophy of all the prominent superficial glands. The first to show any appreciable increase were two anterior to the left ear, just above the parotid. The post-auricular of the left side was the size of a hazelnut, and very sensitive. The post-cervical soon assumed the dimensions of a black walnut, but was not specially sensitive. The entire cervical group and the submaxillary glands were so enlarged as to be palpable. The glands of the trunk, with the exception of the epitrochlear and inguinal, were more or less involved and possessed uniform sensitiveness. The left axillary was the largest, the size of a walnut. On the whole, this hypertrophy of adenoid tissue was greater about the



head and neck than upon the trunk, and less upon the lower extremity. The magnitude of the glands of the right side was not more than one-half that of those on the left side. There was no evidence of adhesions, the glands being readily separable. As a rule, the smaller were much harder than the larger ones. This briefly describes the condition of the patient when first seen.

Clinical History. Three days later there was a marked change in the primary lesion, the dimensions having increased four millimetres. This rapidity in the development seemed to demand its immediate removal, especially as its exact nature was not known. The operation was performed on the following day under cocaine infiltration, by making an incision around the growth. The edges were brought together by sutures, the wound healing quickly and bearing a fair linear cicatrix. The material of this growth, together with that of growths on the other portions of the body, was used for microscopical examination, to be described later. It will be sufficient at present to say that the growth was of a lymphomatous character. The patient was afterward placed under the hypodermic administration of arsenic. The subcutaneous injections began with six drops of Fowler's solution, increased two drops weekly, daily administered, and within three weeks all the manifestations showed improvement. New lesions ceased to form, the old ones manifested less infiltration, and all assumed a similar discoloration, which in the course of four weeks changed to a dark brown, and finally began to be absorbed at the periphery of the various smaller lesions. At the end of six weeks the larger infiltrated patches had practically cleared up, and the tumors disappeared, as well as the enlarged blood-vessels and cyanotic tinge. The skin resumed its natural aspect, except in the matter of pigmentation. During this period the improvement was progressive, but on June 4th there was an unexpected return of the difficulty, the glands taking on their former proportions. For the abruptness of this return there was no assignable cause. The new condition was, however, brief, for, after the lapse of thirty-six hours, the tenderness subsided and the hypertrophy of the glands gradually began to decrease. The general condition of the patient during the paroxysm was good; his appetite was excellent; there was no rise of temperature; the secretions were healthy, and the excretions regular; there was no change in the organs; the urine was normal. He was now receiving twelve drops of Fowler's solution hypodermically administered each day. Everything went well until July 1st, when it was noticed that the condition was undergoing a change. The skin assumed a shade of light bronze, especially pronounced on the back, the chest, and hypogastrium, and three growths suddenly appeared, one on the scalp and two on the back.

On July 7th it became necessary for him to return home. However, he continued the treatment during his absence, and returned on July 10th, when another lymphatic enlargement ensued, involving the inguinal glands on the right side, which were greatly increased and seemed hard to the touch. The largest of the cervical chain, which was apparently encapsulated, was now extirpated. Its contents were quite soft, appearing very much as if they had undergone mucoid degeneration. At the same time a change took place in the general condition of the patient. His physique was less robust and his gait less sprightly; he seemed drowsy, stupid, and weak; the mucous membranes began to show paleness: the enlarged glands manifested an appreciable increase, as did many others not previously affected. Those under the ramus of the lower maxillary gained the most, causing a pressure which provoked a cough. Expectoration was increased.

Petechiæ appeared for the first time upon the shoulders. Fresh hemorrhages, which encroached upon the back and chest, occurred daily, gradually extending down the arms. These hemorrhages developed slowly and were limited to the localities mentioned. The greatest number of confluent lesions was formed upon the chest. In certain regions they were thick and circumscribed, or of a linear configuration, and at every new outbreak were conspicuous, red, and bright. In size they varied from a pin's head to a pea, well defined, and uninfluenced by pressure. During the ten days following their original manifestation both sides were profusely studded with them. They were also present upon the eyelids and conjunctivæ; the ophthalmoscope revealed their existence on the retina of each eye and showed that the bloodvessels were dilated and tortuous. Pigmentation was marked and rapidly increased. This was especially pronounced over the hemorrhagic area. In fact, the entire surface showed both a rapid transformation and a decided increase in color, the earlier idiopathic pigmentary spots becoming so dark as to resemble nitrate of silver stains. Many of the spots on the chest coalesced, and, the skin becoming generally pale, the contrast was naturally great. There were no evidences of pigmentation in the mouth.

An erythematous discoloration was also in evidence, especially well defined upon the arms. This readily disappeared upon pressure. From these prominent changes in the skin it was naturally concluded that the blood might demonstrate equally definite alterations. The mucous membranes and the finger-tips exhibited a peculiar pallor. Nothing unusual was found upon physical examination, with the exception of a systolic murmur. Pulsation of the bloodvessels of the neck was clearly visible, those of the temporal region being especially conspicuous. A provisional diagnosis of lymphatic leukæmia was made, and the blood examination resulted as follows:

Hæmoglobin	40 per ct.
Specific gravity	1,043
Red cells	1,936,000
Macrocytes present in moderate numbers.	
Microcytes the same.	
A few poikilocytes.	
Red cells somewhat pale.	
102 normoblasts to the cubic millimetre.	
White cells	34,000
Small lymphocytes	95.5 per ct.
Large lymphocytes	0.7 "
Eosinophiles	0 4 "
Polymorphonuclear neutrophiles	3.4 "

The lymphocytes varied somewhat in size, the majority, while conforming to the normal contour, were of greater dimensions than those of the ordinary cell.

The physical examination now made revealed no appreciable rise in temperature, yet the pulse recorded 110 beats per minute. A slight fulness in the left epigastric region was noticeable, and the spleen was somewhat enlarged, the estimated perpendicular diameter being about ten centimetres above normal. The organ was apparently smooth; both deep pressure and percussion over the sternum proved painless.

July 18*th*. The glands about the neck, having rapidly augmented, became distinctly individualized, and resembled a festoon which swept around the inferior maxillary bone and extended from ear to ear. With the exception of a few that were small the knots attained the dimensions of a hen's egg. Owing to their location and extraordinary proportion they were tender and sensitive, occasioning great pain and increased flow of saliva. The gums were blue, swollen, and spongy, with a tendency to bleed upon the slightest provocation. The teeth were covered with sordes, and the lips were dry. In connection with this peculiar enlargement, soreness of the throat set in, which, in the form of a hypertrophy, was mostly limited to the tonsils. These within a week grew to such an extent as to impinge upon each other. The thyroid gland was not apparently involved. The patient became easily fatigued, his appetite was impaired, and he could not sleep. There was some dyspnœa, with a frequent cough, due, in all probability, to the enlargement of the tonsils. An analysis of the urine showed it to be about normal in color; acid reaction; specific gravity 1020; no albumin; no sugar; yellowish-white sediment; no casts; uric acid crystals; uric acid 0.784 grammes.

19th. The patient was now confined to the house. Following a severe paroxysm of coughing the purpuric eruptions appeared for the first time upon the cheeks, neck, and back; heretofore they were almost invariably found only upon the chest. Morphine was administered with little or no effect. The gums continued to swell until they nearly covered the teeth, ulcerations were discovered surrounding the bicuspids, and the bronzing of the skin became more and more pronounced.

20th. The patient appeared weaker and more languid, was still sleepless, and complained bitterly of pain about the region of the neck. His temperature was 99.5°, pulse 120, with a slight outbreak of purpura.

21st. Condition unchanged. Examination of the blood showed that microscopically it was pale and thin; coagulation took place slowly and irregularly.

Red cells	1,776,000
Microcytosis and macrocytosis fairly marked.	
Poikilocytes in fairly large numbers.	
Nucleated cells 225 to cubic millimetre.	
A number of polychromophiles.	
White cells	45,000
Small lymphocytes	95.3 per ct.
Large lymphocytes	1.6 "
Polymorphonuclear neutrophiles . . .	2.3 "
Eosinophiles	0.6 "
Myelocytes	0.2 "

Temperature 99.8°, pulse 124. The lower lip became suddenly œdematous, increasing to three times its natural size.

22d. Nausea and vomiting, with an outbreak of purpura in close proximity to the hairy scalp. No new spots on the body. Deafness of the left ear, accompanied by roaring and ringing, the result of hemorrhages in the meatus and on the tympanum.

23d. The hemorrhagic eruptions gave evidence of becoming paler, and after the lapse of three days had almost entirely vanished; restlessness increased.

26th. The pain in the throat was augmented, especially during deglutition, the right tonsil having become ulcerated. The ulcer was as large as a five-cent piece, well defined with sloughing edges. The œdema of the lips had sensibly diminished. The general tumefaction of the lymph nodes that was so characteristically marked had begun to subside. This was especially true of the glands beneath the inferior maxillæ. Temperature 100°, pulse 140.

27th. At one o'clock in the morning the patient was subjected to severe retching and vomiting. On the following morning the entire cutaneous surface was much reddened, with subcutaneous hemorrhages, affecting even the loose cellular tissue of the eyelids. Patient swallowed with difficulty; external pressure over the tonsils caused great pain. New symptoms appeared in the form of diarrhœa and dark-colored urine. The abnormal color in the urine disappeared the same day, but the stools were frequent and copious and continued until the day following. The glands had materially decreased. Urine passed, 2040 grammes; specific gravity, 1021; uric acid, 1.44; slight amount of albumin, no sugar.

28th. Symptoms more intensified; condition weaker and much depressed; the ulcerated tonsil extremely sensitive. Patient vomited at noon; retching not marked; no purpura followed. Temperature 104°, pulse 140. The urinalysis of specimen passed in twenty-three hours showed the amount to be 2940 grammes; specific gravity, 1023; color high; aromatic, but not disagreeable; reaction acid; urophen and indican increased; urea, 39.403; uric acid, 2.64; sulphates, 9.364; phosphates, 3.470; no bile pigment; no sugar; no albumin; sediment consisted of squamous epithelial cells, probably of urethral origin; red cells not detected; leucocytes plentiful; a few hyaline casts; sediment thickly covered with uric acid crystals. Bacteriological examination by swab from throat revealed streptococci and various other micro-organisms.

29th, 8 A.M. No appreciable change in patient's condition except that he was more depressed. Pulse 150, temperature 104°. At 5 P.M., pulse 160, temperature 105°, pulsation of the carotid distinctly visible; no desire for food; extremely weak; slough on tonsil mostly gone; its edges and base were bright red, while the adjacent mucous membrane was pale. Patient complained bitterly of lancinating pain on the inner side of instep. Spleen showed no increase, as before. Percussion over the sternum no longer painful. The amount of urine voided for the past twenty-four hours was 3240 grammes; specific gravity, 1021; uric acid, 4.94 grammes. At midnight, temperature 106°, pulse 160, respirations 50. Epistaxis discharge usually pale; evidence of coagulation where it came in contact with the towel. The bleeding ceased at 1 o'clock. Patient complained of pain over the plantar arch of both feet.

30th. In the morning patient not so restless, but much weaker; pulse 160, temperature 106°, respirations 40 to 50. In the evening he was decidedly weaker. Pulse 180 and very thready, temperature 107°. Sponge-baths continued as the only means of effecting any relief. Patient complained of discomfort in his right hand, which was more or less œdematous on dorsal surface; the same was true of the free border of the ribs on the right side of body. Mouth parched; bowels moved involuntarily; the lymph nodes could only be detected upon palpation. The blood examination twenty-four hours before death demonstrated that it was very thin and pale, with only a suggestion of coagulation.

For this purpose it was taken from lobe of left ear, and gave the following results:

Red corpuscles	803,000
Leucocytes	1,600
Specific gravity	1030
Hæmoglobin	30

Normocytes pale, microcytes moderate number.
Megalocytes large number.
Poikilocytes.
Schistocytes few.
Normoblasts none.
Blood-plates increased.

The following relation existed among the leucocytes:

Small lymphocytes	88 per ct.
Lymphocytes (transitional and large)	1 "
Polymorphonuclear neutrophiles	10 "
Eosinophiles	1 "

The last examination (incomplete) was made ten hours later, or just before death. This revealed a remarkable reduction of the leucocytes, namely, to 600 per cubic millimetre. At midnight the pulse was weak, rapid, thread-like, and intermittent; temperature approached 108°, respirations 38, and tubular in character; heart sounds almost inaudible; general condition greatly relaxed and very feeble. At 2 A.M. patient powerless and flaccid; temperature still elevated; at times slightly delirious, but when spoken to would answer intelligently; heart sounds inaudible; respirations gradually diminishing; easy death at 3.30 A.M.

Autopsy Notes. An autopsy was made eight hours after death by Dr. Herbert U. Williams. Body fairly well nourished; rigor mortis quite firm; pigmentation of the skin over the upper part of the chest and back and distributed irregularly, that upon the chest most marked, the patches being about the size of a dime. In other places they had coalesced and had formed irregular patches. The rest of the skin covering the body presented a dark-gray appearance. Petechiæ appeared upon the chest and were isolated near the pigmented border, although confluent toward the centre. There were three small tumors in the skin covering the abdomen. On section they showed a whitish appearance. Some superficial lymph nodes gave evidence of enlargement upon palpation. The cervical, supraclavicular, and inguinal were the most pronounced, although manifesting a marked decrease in size compared with their dimensions before death. They were of firm consistency and freely movable. The subcutaneous adipose tissue was small in amount.

Thorax. The pleural cavity contiguous to the smaller bronchi was studded with lymph nodes about the size of a pea. The peribronchial lymph nodes varied in size from a pea to a chestnut. Upon repeated sections they looked like raw flesh, apparently the result of hemorrhages. No caseation was present. The thymus gland was patent.

Lungs. Lungs somewhat dry, pale, and presented nothing of interest except a few small superficial hemorrhages. The pleural cavities contained no fluid.

Heart. The pericardium contained about three ounces of perfectly clear serum; the parietal layer was covered with minute petechiæ. The lymphatics of the outer surface of the heart were dilated with lymph to the size of a straw. The right ventricle was distended, containing a pin clot and a small amount of blood. The left ventricle was contracted and nearly empty; its posterior wall had a petechial spot. The heart muscle was firm and pale, and the valves were all in a normal condition. The peritoneal cavity contained a small quantity of serum, but was otherwise apparently normal. The omentum was distinguished by enlarged lymph nodes which were about the size of a small pea. The retroperitoneal lymph nodes also showed definite enlargement.

Stomach. The various layers appeared normal, with the exception that throughout they were studded with enlarged lenticular follicles about the size of a French pea.

Intestines. The contents consisted of a semi-fluid, yellowish-white milk stool. Marked hypertrophy of the mesenteric lymph nodes was noticed. These varied in size from a pin-head to a pea. The solitary follicles were enlarged. Near the ileocæcal valves Peyer's patches showed thickening. The vermiform appendix was normal.

Spleen. Weight, one-half kilogramme. On section trabeculæ not distinct. Malpighian bodies large and well marked.

Liver. Weight, two and one-half kilogrammes. Smooth and pale in color. On section very coarsely mottled with varying shades of red, corresponding with areas comprising several lobules. A substance covered the diaphragmatic surface which looked like fibrin. The gall-bladder contained about 43 grammes of pale bile, otherwise normal.

Kidneys. The ureters were normal. The left kidney was large and soft, weighing about 175 grammes. The capsule was pale and covered with petechiæ, and was easily stripped off; cortex very broad, having a swollen and hemorrhagic appearance. The cortex was covered with peculiar pale-gray streaks. The right kidney was the same as the left. Suprarenal bodies normal.

Bone-marrow. The bone-marrow of the sternum was slightly paler than normal.

Bacteriological Examination. During life the following examinations were made: Portions of the tumor removed from the breast were placed in the peritoneal cavity of live dogs. The blood of the animals was examined at two different times without any change. Four months later the dogs were killed and the blood was found to be in a healthy state. No enlargement of the lymph nodes or other abnormal condition was noted.

Inoculations made from a tumor into various culture media unfortunately became contaminated. There was difficulty in getting cultures from the skin. Swabs on agar made from the ulcer of the throat three days before death, placed in the incubator and examined after seventy-two hours, showed various cocci and bacilli, among them numerous streptococci. Examination in sections of the tumors removed during life for bacteria, also of the blood for the parasites described by Lovett, were negative.

The following results were obtained at the post-mortem: Smears made from the various organs were all negative, with the exception of those made from the spleen, which showed the streptococcus only sparingly. Cultures, including anaërobic, were made on different media at the post-mortem and placed in the incubator. The cultures on agar were made from the lung, blood of right and left ventricle, liver, kidney, bronchial lymph node, post-peritoneal lymph node, spleen and bone-marrow. Cultures from the bone-marrow and lymph nodes were also made on human blood serum. Streptococcus pyogenes were grown from all the organs. The staphylococcus pyogenes aureus was recovered from a bronchial lymph node along with the streptococcus. The post-peritoneal lymph nodes showed an organism resembling bacillus coli communis, and the kidney a large bacillus resembling the hay bacillus. These were regarded as post-mortem invasions without significance.

Histological Examination—Cutaneous Lesions. For the microscopical investigations made during life, in addition to the material obtained from the initial lesion on the forehead after its removal, fragments were also procured from the affected skin surrounding the left nipple, from the patch located over the sternum, and from another patch situated upon the abdomen. These were hardened in substances conventionally recognized for such purpose. The paraffin sections cut therefrom were stained by the usual method. These various sections showed microscopically that the tumor was essentially of a similar structure throughout. The fundamental tissues largely consisted of lymphoid cells. The growth proper principally occupied the structure of the cutis and subcutaneous tissue. Its greatest development took place in the vascular reticulum of the latter. The cellular infiltration was so great that it pressed apart the normal structures. The cells of the adipose tissue were widely separated by this diffuse process, and the layers much increased in thickness. In the superior partis vascularis of the corneum, at the periphery of this growth, there was comparatively no infiltration, while it was exuberant and characteristic about the inferior partis vascularis and around the bloodvessels adjacent to the subcutaneous tissue. The thickness of the infiltration varied considerably, reaching as high as 2 cm. These abnormal cells were usually round, except where the shape was modified by pressure. They consisted of a homogeneous protoplasmic rim which took acid aniline stains and a relatively large, round nucleus. Each nucleus seemed to possess a membrane, and a distinct round nucleolus occupied its centre. No mitoses were seen. The nuclei possessed a characteristic network, forming a rim with numerous dark points within it. Certain stellate cells, probably connective-tissue, were found, possessing large protoplasmic bodies and yellow pigment granules. These were not always present, although found in the majority of specimens of the true skin and subcutaneous tissue. The deep epithelial cells were generally pigmented. Isolated masses of pigment were found in all the growths investigated, and were especially prominent in the deep-seated parts. In looking over the sections that were stained with polychrome methylene-blue for mast cells they were seldom detected either among the cells of the tumor or connective tissue. Plasma cells were never discovered. The hæmatoxylin stain demonstrated the presence of numerous homogeneous bodies of irregular or roundish contours, with a well-defined nucleus, that were much smaller than the tumor cells. They took the dye deeply, were well outlined, and were most frequently encountered in the true skin, less often in the connective tissue, occasionally in the striped muscles, and but rarely in the centre of the tumor. In structure and appearance they closely resembled the parasites claimed by some writers to exist in certain tumors as well as in connection with other affections. They might, however, have been the result of nuclear degeneration. Many sections showed small clusters of three to six in the reta cells, which had apparently lost their prickles, yet their nuclei were well stained. If these bodies were the products of degeneration those found in the muscle must have been derived from the muscle-cells, those in the connective tissue were probably disorganized nuclei, and those of the tumors may possibly be regarded as the result of nuclear degeneration.

The trabeculæ of the connective tissue in the new growths consisted of a reticulum of interlacing bands, or fibres, least conspicuous where the infiltration was intense. This reticulum contained the lymphoid cells, and the whole arrangement was suggestive of a lymphadenoma. Using Weigert's stain for elastic tissue, elastic fibres could easily be demonstrated in the neoplasm. Especially was this true in those portions of the growth where the process was most active. The elastic fibres were rather more numerous in the large tumors. They were most abundant about the sweat-glands and hair-follicles. In the walls of the bloodvessels, wherever there was any thickening, the elastic tissue was apparently augmented. The arteries in the tumor masses sometimes showed a thickening of their walls from an infiltration with lymphoid cells. This process was most marked where the tumors were the largest.

Early in the infiltration the integrity of the hair follicles and their appendages were well maintained, but later on they were surrounded by an accumulation of round cells, when their outer sheaths became infiltrated and finally obliterated the follicle, the hair alone remaining.

The alterations in the sudoriferous glands varied with the location. Those in contact with the tumor showed the reproductive nucleated cells within the lumen to be swollen, and at times completely filled the duct. Later they became so modified and disarranged as to be confused with the neoplastic cells. In those portions of the neoplasm most highly developed they were entirely obliterated.

The sebaceous glands seemed for a long time to resist the infiltration, but when completely surrounded and penetrated by the new-growth cells were apparently made to disappear.

Every layer of the skin was infiltrated, with the exception of the stratum corneum, this being somewhat modified by the pressure of the cellular infiltration from beneath, varying much in thickness, from a few cells in some localities to the normal condition in others. In no instance could the cells of which the tumor was composed be found to infiltrate the epidermis. There was no evidence of porokeratosis or desquamation. The changes noted were important, in that they were characteristic of the disease under consideration. The reta mucosum in certain places was much altered and varied so greatly as to force the conclusion that these changes were secondary to the tumor formation. The interpapillary processes were obliterated by pressure. Not a few of the prickle cells were more or less swollen by reason of œdema of the interepithelial spaces. Here and there in the rete were vacuoles. In these free spaces leucocytes could occasionally be seen. The stratum granulosum was conspicuous and consisted of two or more layers, while the stratum lucidum could only be recognized at certain points. The pigmented skin, which was free from tumor, showed a pronounced increase of thickness in the granular layer, which encroached upon the stratum mucosum. The pigment consisted of brownish-yellow or black granules, uniformly deposited, which could likewise be detected in the ducts of the sudoriferous and sebaceous glands.

Internal Organs (Microscopical). On microscopical examination of the tissues of the various internal organs, which were placed in Zenker's fluid at the time of autopsy, the leukæmic infiltration was found to have affected all the organs. It was not, however, as pronounced as in the masses taken from the skin.

The bronchial lymph nodes showed a great increase of the cellular elements. The capsules were thin, and there was no evidence of inflammation around the nodes. Adjacent to these were many hemorrhages and numerous pigmented cells. Hemorrhages were discovered in the nodes, and there were numerous red blood-corpuscles among the lymphoid cells. The lymph channels all through the nodes were packed with red corpuscles and lymphocytes; occasionally large flattened cells appeared. Many of the larger cells contained pigment. It was rare to see two or three nuclei. Some of the lymph channels were crowded with pigmented cells; the larger of these rarely contained red corpuscles or lymphocytes. Numerous irregular masses, stained blue by Gram's method, about four times as large as the lymphocytes, were found, which appeared to be some hyaline substance. Many groups of lymphocytes showing fragmented nuclei were noted. Occasionally a mass of cocci was seen, some of which when stained by Gram's method proved to be streptococci. The groups of cocci failed to show any relation to the cells having fragmented nuclei. Masses of cocci were also found inside of the veins, others in the capillaries. Certain veins showed thrombi composed of mixed layers of lymphocytes, red corpuscles, blood-plates, and fibrin. Sections of the abdominal lymph nodes revealed substantially the same changes as those made in the bronchial nodes (or glands), and sometimes large multinucleated phagocyte cells abounded. In certain cases the adipose and areolar tissue about the nodes contained numerous lymphocytes. Evidences of hemorrhages in and around these nodes were frequently discovered.

Spleen. In sections of the spleen it was found that the changes were similar to those in the lymph nodes. The capsule was normal. The Malpighian bodies were numerous, distinct, and enlarged, often being twice the normal size. They also contained normal-looking lymphocytes and great numbers of large flat cells. The splenic pulp was crowded with lymphocytes. There were occasionally fragmented nuclei as well as numerous cells with very large nuclei, or with several nuclei (two to five). These sometimes contained pigment. Mitosis, polymorphonuclear plasma cells, or mast cells were rarely seen in this or any other section. One very large phagocytic cell contained eight other cells with degenerated nuclei. Numerous masses of cocci appeared in the spleen pulp, and at times short chains could be distinguished. There were no eosinophilic cells.

Bone-marrow from the Sternum. On microscopical examination the marrow cells and nucleated red corpuscles were found comparatively few. Lymphocytes were present, but not conspicuous. Preponderance of small mononuclear cells, slightly larger than red corpuscles, could be seen. Some large cells resembling endothelium cells were discovered. The eosinophilic cells were few. There were some doubtful giant cells. Fragmentation of nuclei was not pronounced. Some groups of cocci were seen.

Heart. Many lymphocytes were seen. Fragmentation of nuclei was detected. The heart muscle was not remarkable. Single lymphocytes lay between the muscle cells. In the lymphoid spaces collections of minute lymphoid cells were discovered. No bacteria.

Lungs. No evidence of bronchitis, pneumonia, or pleurisy. The outer layers of the bronchi, especially the smaller bronchioles, as well as the alveoli, were richly infiltrated with lymphoid cells. There were hemorrhages in the submucosa of the main bronchus, and in the wall below the epithelium a cell infiltration, mostly consisting of lymphocytes, together with plasma cells. There was a similar increase of cells in the walls of the bronchial tubes. Lymphoid cell deposits were found between the mucosa and submucosa and throughout both layers. There were plasma cells mixed with red corpuscles in the mucous membrane, although less numerous than the lymphoid cells. Several thrombi of leucocytes and fibrin were discovered in the various arteries.

Liver. The capillaries were distended with (chiefly) red corpuscles. There was also a lymphoid infiltration extending along the portal spaces and pushing out between the liver cells. Inside of the capillaries emboli of micrococci were often to be seen, but there was no evidence of inflammatory action in their vicinity. Considerable light brown granular pigment was present in the liver cells.

Duodenum. The solitary follicles were composed of cells of the lymphoid type and plasma cells in moderate numbers, the last not striking. Between the glands the lymphatic tissue was but slightly increased.

Colon. The solitary follicles were large and numerous. In many of the lymph channels of the submucosa lymphocytes were found in large numbers. Evidences of hemorrhages and numerous bacteria, probably saprophytes, were found in the mucous membrane.

Kidneys. The lymphatic collections were most marked in the cortex at its junction with the pyramid. They were sometimes seen about the veins and, in rare instances, apparently in the sheath of the vessel. This was a marked feature shown in all sections examined. The convoluted tubes contained reticulated coagulum, which was also seen around the glomeruli. These were occasionally compressed. In many sections lymphocytes were seen between the cells of the tubules. The nuclei of the epithelial cell stained well.

Pancreas. The fibrous tissue surrounding and adjacent to the pancreas was œdematous; many loose red corpuscles were seen in it. There was some infiltration with small nucleated cells. No evidence of pigmentation from previous hemorrhages. The ducts and the glandular parts of the pancreas were normal. The cells of the infiltration were found to be large lymphocytes. Fragmented nuclei were only exceptionally seen. There was infiltration with lymphocytes close to the pancreas, resembling lymphoid tissue and apparently not connected with lymph nodes. No bacteria were detected.

Adrenal Bodies. No special change was noted and no bacteria were found.

Thymus Gland. The connective tissue about the gland showed marked hemorrhagic infiltration, which appeared recent, as well as a few yellow pigment granules. Hassall's corpuscles were large and distinct. The thymus gland possessed numerous ordinary lymphoid cells. The distinction between cortex and medulla was barely discernible. The adjacent connective tissue contained lymphocytes, which seemed to pass from the thymus proper to the adjacent tissue. A few eosinophiles were discovered. No fragmented nuclei were apparent; a few hyaline bodies were seen. The capillaries contained masses of streptococci.

A point worthy of note was that throughout the lymphoid structures appeared areas of nuclear degeneration and fragmentation. Although the nodes contained emboli of micrococci, the areas of fragmentation showed no relation to the bunches of cocci. It may be presumed, therefore, that the degeneration was due to toxins formed by the micro-organisms rather than by direct action of the organism upon the cells.

This case is a striking illustration of leukæmic changes, especially in their relation to the skin. The tumor formations originated in the hypoderm and terminated in nodules, and were readily discovered by palpation. Frequently they would spontaneously disappear, or were compelled to do so under the influence of arsenic. Later, however, when they began to involve the superficial layers of the skin and to become elevated they manifested a disposition to become permanent—more so than when deep-seated. The color of the skin overlying the lesions was practically normal, while over those in which the superficial layers of the skin had become implicated it was first red, then violaceous. These sequences, however, were not absolute, for, occasionally, the several shades were tinged with hemorrhagic streaks. The size of these deep-seated nodules was that of a hazel-nut. The deeply buried lesions were practically oval; the superficial ones were also oval, but were more or less flattened, or pad-like, and covered a considerable surface.

Cases of leukæmic infiltration of the skin have been recorded in medical literature since 1876, first by Bisiadecki,[1] followed by Hochsinger and Schiff,[2] Philippert,[3] and Oliver.[4] Most prominent among the more recent reports of excessive leukæmic growth may be mentioned the case of Kreibich,[7] who reports that the pendulous masses, which varied in size from a pigeon's egg to the adult fist, were found upon the face. The history of the majority of cases recorded shows that this locality is the common seat of leukæmic invasion. However, in the case under consideration, they predominated upon the chest. In referring to their frequent occurrence upon the face, Pinkus[6] argues that the explanation lies in the fact that this part of the body lacks protection from external injuries, or that it may be due to a better blood-supply. From my own observation of the present case I venture the opinion that it sustains the theory of infection. In this instance the infection possibly originated at the site of the initial appearance of the disease, which was upon the forehead, and it took place long before there was any lymphatic enlargement. From the excellent résumé of Pinkus it would appear that all such tumor-like formations occurring in the skin are clinically and histologically identical, for he makes no distinction between those found in lymphatic leukæmia and those in pseudoleukæmia. Microscopically, the cutaneous alterations of the present case correspond with the findings of Kreibich, Nékám,[3] Pinkus, and Oertel,[5] who considered the microscopical structure analogous to lymphocytes deposited in the skin. In the case now discussed there was no marked suggestion of mitosis. The cells in size and form were identical with the lymphocytes, and were usually discovered within the walls of the vessels. It was observed that the cells were first lodged within the meshes of the corium, in close relationship to the subcutaneous tissue. The fact that a small number of lymphocytes were congregated about the bloodvessels in apparently normal skin—observed by Kreibich—was also noticed in the present instance.

One of the most striking features of the case, in the earlier stages of the disease, was the pronounced change in the complexion. The countenance assumed a vivid tinge of pink that challenged attention. This abnormal hue was undoubtedly of a hæmatogenous character. Another symptom of note was the dual pigmentation, depending upon several causes. First, we had the idiopathic pigmentation, which appeared early in circumscribed areas, while the physical condition of the patient was still unimpaired. Its initial color was yellow, but the older the areas the darker they grew. There was no inclination on their part to coalesce. Second, we had a secondary pigmentation which was more or less general, covering the entire chest and back to such an extent as to efface all traces of the first, existing in discrete and isolated patches. This was purpuric in character, and appeared in various shades of brown and black.

In reviewing the blood examination many interesting points may be recorded.* The most noteworthy were the blood changes, apparently demonstrating the development of lymphatic leukæmia from pseudoleukæmia, and showing that the blood upon the first examination was practically normal, not even revealing any marked diminution in the hæmoglobin. It was only when the case was advanced that a leukæmic condition was determined. However, the apparent transition of the pseudo type to that of the lymphatic was quite abrupt. The trans-

* While the title of this paper sufficiently indicates the writer's own interpretation, he is, nevertheless, fully conscious that there is room for a legitimate difference of opinion concerning the case. That could hardly be otherwise, so long as the classification of lymphosarcoma and pseudoleukæmia is so indefinite and unsatisfactory as at present. The question is sure to arise whether the facts of this case really justify the diagnosis of pseudoleukæmia developing into true leukæmia. The blood was at first normal, without leucocytosis or relative lymphocytosis It subsequently changed to the picture of leukæmia, with leucocytosis and high relative lymphocytosis—96 per cent. lymphocytes. The affection at first was either pseudoleukæmia or aleukæmia. Considering the limitations of our knowledge regarding the occurrence of an aleukæmia in the presence of physical signs of leukæmia (*i. e.*, glandular swelling) as a preleukæmic stage of true leukæmia, we prefer to take our stand on the simple facts of the case and say that the case was at first not true leukæmia, but pseudoleukæmia. Our knowledge of this condition may, in the future, be so enlarged that we shall be required, before reaching a positive diagnosis of pseudoleukæmia by blood examination, to hold the case under observation for a considerable length of time, in order to exclude the possibility of the existence of an aleukæmia preleukæmia.

mutation of pseudoleukæmia into genuine leukæmia is known, but is exceedingly rare. Reference may here be had to the cases reported by Mosler,[9] Fleischer and Pentzoldt,[10] Troje,[11] and Cabot.[12] Pentzoldt mentions a form of lymphatic Hodgkin's disease different from the ordinary variety of pseudoleukæmia which may result in true leukæmia. In comparing the first blood examination with the second the only noticeable change was in the number of leucocytes with secondary anæmia—the principal argument for the separation of pseudoleukæmia and lymphatic leukæmia. The same augmentation was manifest in the second and subsequent examinations. The only difference was in quality. After the second analysis the alterations in the skin showed the same clinical features. There was apparently the same general swelling of the lymph glands, the same cutaneous pigmentation and tumor formation, with the absence of any special enlargement of the spleen or any other internal organ. However, the patient appeared somewhat weaker, with a slight pallor of the visible mucous membrane, sufficient, however, to demonstrate that some important changes had taken place, and that we were dealing with a different type of leukæmia than that found at the first examination. There was a preponderance of leucocytes and an increase of the mononuclear elements over the polymorphonuclear neutrophiles, and a lack of myelocytes, all clearly certifying to the presence of lymphatic leukæmia. The further progress of the leukæmic stage showed a rapid loss of red corpuscles. The nucleated red cells also decreased, but, as the disease progressed, there was a considerable increase in the macrocytes. There was an enormous augmentation in lymphocytes, both relative and absolute, 95 per cent. of the 34,000 being small lymphocytes. A striking peculiarity of the case consisted in the fact that it ran its course with singular fidelity to its type until about one week before death, when severe soreness of the throat supervened, accompanied by grave constitutional symptoms. The temperature became unusually high, with rapid loss of strength, suggesting general infection. The enlargement of the lymphatic glands suddenly subsided, especially as concerned those about the neck, so that at the time of the patient's death they could only be detected by palpation. The blood showed, associated with this secondary infection, a drop from 45,000 cells to 600 per cm., with an increase in the proportion of polymorphonuclear neutrophile cells of 3.4 per cent. to 10 per cent., and a decrease in the proportion of lymphocytes of 95 per cent. to 88 per cent.—all within eight days. The infection was due to the streptococcus pyogenes, a fact corroborated by the bacteriological examination of secretions taken from the throat just before death, and verified by subsequent examinations made at the time of the post-mortem. The smeared preparations not only revealed the streptococcus, but it was also cultivated from the tissues procured from the various organs of the body. It has been recognized for many years that the most striking changes in leukæmia occur following secondary infections, to such an extent that all features of the blood are altered. Herrick[14] reported a case of lymphatic leukæmia with a streptococcus infection beginning in the tonsils which was very much like the case under consideration. In acute leukæmia apparent improvement has been noticed, especially marked as to the leucocytosis, as the infection developed. In all probability it does not prolong life, as has been suggested, but only acts as a moderating agent for the time being. It is interesting to note the analogies which these phenomena present with the disappearance of sarcomata after the injection of the toxins of the streptococcus, as reported by Coley. Of the two cases reported by Fraenkel,[15] one on March 6th showed the presence of 89,000 leucocytes, consisting principally of lymphocytes. On March 21st the streptococcus infection was discovered, and on March 26th the number of leucocytes had decreased to 6000. In the second case following the infection the leucocytes decreased from 22,000 to 1200, yet death was the ultimate result in both cases. In other well-known recorded cases, as, for instance, Muller,[16] the leucocytosis fell from 246,900 to 57,300; in Kovács,[17] from 67,000 to 17,000; in Zeissl's,[18] from 140,000 to 9350; Cabot's, from 40,000 to under 500; Kormoczi, from 20,000 to 1000. In most of these cases there was also a diminution in the size of the spleen.

The unusual increase of the uric acid eliminated in the present instance, notwithstanding the fact that it corresponded with that of the cases previously observed, deserves special mention. The urine was carefully studied during the last few days of the patient's life, after the intercurrent infection had become active. Previous examinations had shown the constituents of the urine to be about normal. The greatest amount voided at any time during twenty-four hours occurred between noon of July 28th and that of July 29th, being 3240 grammes, containing 4.94 grammes of uric acid. This unusual increase took place when the sepsis had reached its height. There was no special attention given to the quantity or quality of food throughout the whole course of the disease, other than for the last few days. After the onset of the sore-throat the patient took, daily, about three pints of milk, six ounces of whiskey, and four eggs, with an unlimited amount of water to quench the thirst accompanying the high fever.

There seemed to be a marked relation between the elimination of uric acid and the loss of lymphocytes in the blood, although the sudden decrease of all lymphatic gland structures must also be taken into consideration as well as the food. In this connection attention is directed to the areas showing nuclear degeneration found in the bronchial and other lymph nodes. An increase in the elimination of uric acid is, as a rule, noted in all cases of acute leukæmia ending in rapid destruction of the white cells, due to the sepsis or to infection. A. Magnus Levy[19] has recorded the most remarkable phenomenon of this character, viz., 8.72 grammes in twenty-four hours. He also observed in the same case, as well as in a number of other acute cases, that there was a large amount of urine and an increase of total nitrogen and uric acid.

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A CONTRIBUTION TO CLINICAL OBSERVATIONS ON BLOOD-PRESSURE.

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The vagueness which has long surrounded terms used to denote variation in blood-pressure has led men of an inventive turn of mind to devise instruments for determining these variations with some degree of accuracy. Special interest has been aroused within the past few years by a decided advance in such instruments which are of clinical value especially by the sphygmometer devised by Messrs. Hill and Barnard, of St. Bartholomew's Hospital, London, and the tonometer of Gaertner. The results of the experiments detailed in this paper have been determined by means of the sphygmometer; and although not an ideally perfect instrument, the results obtained with it are sufficiently uniform and accurate to be of distinct value in following cases from day to day, in keeping records of blood-pressure, and in making valuable observations. The manometer tubes will not soon be replaced in the experimental laboratory; but, of course, their usefulness is *nil* in gaining knowledge of altered blood-pressure at the bedside, to whatever causes due. The sphygmometer is in reality the manometer tubes reduced to a dial (on the principle of the aneroid barometer) and made practical for clinical use.

For those unfamiliar with the instrument a short description of the main points in its construction and method of use will be of interest.[1]

"It consists of (1) a broad armlet, which is strapped about the upper arm. The armlet is formed of a leather or flexible steel band, on the side of which there is fastened a bag of thin India-rubber. The rubber bag is connected by a Y-tube with (2) a small compressing air-pump fitted with a valve and (3) a pressure gauge. The pressure gauge is of special construction. Roughly, it consists of a metal tambour, the expansion of which is exhibited in a highly magnified form by means of an index or pointer which travels around a dial. This dial is graduated in millimetres of mercury."

Method of Use. The armlet, with the rubber bag, is fastened about the arm just above the elbow (or on any part of the arm or leg where it can be made to fit snugly). Air is now forced into the bag by means of the air-pump until the needle begins to move on the dial (there then being a continuous column of air between the bag and the registering mechanism in the pressure gauge). The pulse wave is communicated from the artery to the needle through the column of air already referred to, and is shown by an oscillating movement. The width of the needle's excursion increases with the increasing pressure in the bag until this pressure is equal to the mean arterial pressure, when the excursion of the needle will be at its greatest. The reading in millimetres of Hg on the dial will represent the mean arterial tension. From this point on, with increase of pressure in the bag, the excursion becomes less and less, and finally ceases at a point which corresponds to the maximum arterial pressure. It is, however, only the mean arterial pressure with which we have to do in these experiments.

In order to obtain accurate readings the patient must be at rest in the prone position, as it has been clearly demonstrated by Hill and Barnard:

"1. That the arterial pressure is the same in all the larger arteries while the subject lies horizontally.

"2. In changing from a horizontal to the vertical position the pressure in the upper part of the brachial artery (and it may be assumed also in the carotid artery) either remains constant or becomes slightly elevated.

"3. On changing from the horizontal to the sitting posture the pressure in the arteries of the lower limbs becomes higher than that in the upper limbs by the height of a hydrostatic column of blood separating the two points of observation. If the body remain horizontal and the legs are elevated the converse result holds true."[2]

These results have been proven true in these experiments, except the third point referred to, the correctness of which is assumed from Hill and Barnard's observations. The difference, in the sitting posture, of the mean arterial pressure in brachial and peroneal arteries ranges from 10 to 25 mm. Hg, the average being 17 mm. Hg higher in the latter.

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[1] Hicks. Notes on the Sphygmometer.

[2] Proceedings of the Physiological Society, December 11. 1897.

The armlet is best applied snugly and the reading repeated several times. In a certain number of cases the readings are difficult to obtain, as the oscillations of the needle are very nearly the same over quite a large area—*i. e.*, 5 to 10 mm.; in these the average of several readings must be taken.

Of course, one of the chief advantages of some such method of recording blood-pressure is that it does away with vague terms as "slight," "moderate," or "marked" increase in tension, which necessarily exist where the old method of relying entirely on the touch for one's information is used; for while an individual observer might be able to tell very accurately the relative difference in pressure from day to day, and his interpretation be correct so far as it went, his observations would be of little positive value or have little positive meaning to anyone who could not feel and interpret that particular artery for himself. Hence something definite is conveyed to the mind of anyone reading of a case of nephritis, for example, where the mean arterial pressure is recorded as 150 mm. Hg, knowing the average normal range to be 110 to 120 mm. Hg. Besides which it enables us, in chronic cases associated with increased blood-pressure, to find the drug which will do the maximum of work with the minimum dose—a point of considerable value when it is taken into consideration how long some of these cases require medication.

It is quite without the province of such a paper as this to discuss the various etiological factors in the production of increased arterial tension, and whether such variations are due to changes in the force of the heart's action, contraction of the arteries, thickened or sclerosed arteries, or, again, to direct changes in the composition of the blood itself (aside from the presence of toxic materials which stimulate the vasoconstrictors). For all such discussion one must refer to some of the standard works on the subject. Suffice it to say that changes in arterial pressure are due to any or all of these factors, and no doubt to others not so well recognized. This paper is strictly with reference to determining such changes as exist, from whatsoever cause, in an experimental way, and the modifications of pressure accomplished by certain drugs and procedures.

Of course, clinically, the classes of cases in which information in regard to increased blood-pressure is of the most value are those of nephritis, with or without arterio-sclerosis, and arterio-sclerosis without nephritis; but those cases with lowered arterial pressure are not to be lost sight of, and form an important class by themselves, to be dealt with later.

The number of cases of all descriptions whose blood-pressure was investigated was 129, and the total number of observations on pressure

503. As a routine in every case besides the pressure there was noted the urine examination, the relative amount of arterio-sclerosis present, and the medication in use.

For the normal healthy adult, Hill and Barnard place the average mean arterial pressure in young men at 110 to 120 mm. Hg in the standing position and 100 to 110 in the recumbent. The average pressure for the cases here recorded in the recumbent position was: Males 116 mm. Hg; females, 113 mm. Hg. The highest record of a mean arterial pressure noted was 235 mm. Hg; the lowest, 80 mm. Hg.[1]

For the sake of completeness the subject is divided as follows:

I. Nephritis. (*a*) Acute: without arterio-sclerosis; with arterio-sclerosis. (*b*) Chronic: without arterio-sclerosis; with arterio-sclerosis.

II. Arterio-sclerosis without nephritis: slight; moderate; marked.

III. Effects of some of the arterio-dilators—drugs and phlebotomy.

IV. Blood-pressure in various diseases.

V. Conclusions and résumé.

I. NEPHRITIS.

(*a*) *Acute Nephritis.*

		All 9 cases.	*5 cases uncomplicated.*
With arterio-sclerosis 9 cases. Total number of observations and readings 53.	Highest mean arterial pressure,	150 mm. Hg.	150 mm. Hg.
	Lowest " " "	82 " "	100 " "
	Average " " "	115 " "	128 " "
		All 7 cases.	*There were none uncomplicated.*
Without arterio-sclerosis 7 cases. Total number of observations and readings 50.	Highest mean arterial pressure,	155 mm. Hg.	
	Lowest " " "	85 " "	
	Average " " "	117 " "	

A glance at this tabulated series of cases of acute nephritis shows one that, taking them as a whole, the highest, lowest, and average mean arterial pressure of cases of both classes—*i. e.*, with or without arterio-sclerosis—is almost identical. The five cases of nephritis with arterio-sclerosis uncomplicated by any other conditions, such as acute infectious diseases, etc., show an average pressure rather higher than that of all the cases taken together. This is accounted for by the fact that among the latter are included several cases with extremely lowered vitality, such as lobar pneumonias on the sixth to eighth day, marked anæmias, etc. In no case of a secondary parenchymatous nephritis complicating an acute infectious disease was the pressure over 122 mm. Hg, and it was usually much below this, ranging from 84 to 118 mm. Hg.

In all the cases in which arterio-sclerosis was present in conjunction with the nephritis it was slight or of only moderate degree, and in no case were the arteries stiff and hard; then too, that the highest, lowest, and average pressures were practically the same in the two classes of acute nephritis cases—*i. e.*, with or without sclerosis—shows that slight or moderate arterial thickening plays comparatively a small rôle in the production of increased peripheral tension, a point which will be more clearly demonstrated when dealing with cases of arterio-sclerosis as a whole.

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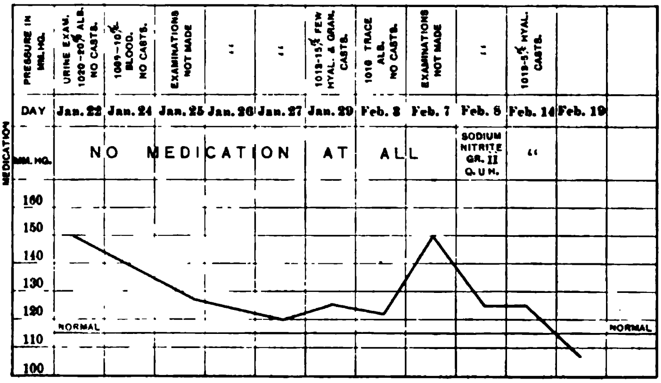
[1] For all discussion in regard to the variations in pressure produced by physiological processes, *e. g.*, sleep, exercise, emotion, etc., one is referred to Oliver's excellent article, Edinburgh Medical Journal, 1898, vol. iv. p. 1.

Another noteworthy fact in regard to these cases is that while we often get a great increase of blood-pressure under any conditions, we may find it normal, or, indeed, subnormal. In the five cases of acute nephritis without other complication than a slight or moderate arteriosclerosis the average tension was 7 to 10 mm. Hg above the normal range.

It was found on examination of the urine in these cases that, on the whole, the greater the amount of albumin present the higher was the mean arterial pressure. This, however, had some notable exceptions, although they were almost invariably found among the cases with greatly lowered vitality from other causes.

Cases of Special Interest.

CASE XXXVII.—Man, aged twenty-five years. No previous nephritic history. Patient has been a steady and heavy drinker for a number of years. Illness began about ten days previously, with loss of appetite, slight fever, and œdema of legs and face. Complained of very slight dyspnœa on exertion. Urine examination on admission: specific gravity, 1012; 20 per cent albumin. Blood: no casts; mean arterial pressure, 150 mm. Hg. The subsequent run of the case is shown by the accompanying chart:



This case shows the normal decline in blood-pressure which goes hand-in-hand with a spontaneous recovery from an acute diffuse nephritis, and, incidentally, the effect of one of the most reliable arterio-dilators. On one occasion there was an abrupt rise in pressure of about 30 mm. Hg without known cause. This fell promptly to normal as soon as sodium nitrite—2 grains every four hours—was given the patient.

There is one case of interest, showing, as it does, the return to normal from a lowered blood-pressure, as the result of exhaustion, on the ninth day, of a lobar pneumonia. The pressure then was 98 mm. Hg. Three days later—*i. e.*, after defervescence—pressure 105; and seven days later pressure 120 mm. Hg, while the patient's general condition had improved with tonics only as medication, the urine in the meantime becoming normal. The nephritis in this case only amounted to a slight transient albuminuria (1 per cent.), due to the acute parenchymatous degeneration complicating the pneumonia.

Further than these observations there was nothing of particular interest to note except the effects of medication on lowering pressure in these cases and a comparison of the averages with those of the cases of chronic nephritis with arterial sclerosis and those of arterial sclerosis without nephritis. This may be done at a glance, the points of comparative interest being brought out in the résumé.

(*b*) *Chronic Nephritis.*

		All 26 *cases.*	19 *cases uncomplicated.*
With arterio-sclerosis 26 cases. Total number of observations and readings 168.	Highest mean arterial pressure,	235 mm. Hg.	235 mm. Hg.
	Lowest “ “ “	85 “ “	112 “ “
	Average “ “ “	177 “ “	187 “ “
Without arterio-sclerosis.	No cases seen.		

There were twenty-six of these cases of chronic nephritis observed, and all were complicated by an arterio-sclerosis of varying degree, there being none seen without it; and so far, as so limited a number of cases can, it shows that with chronic nephritis it is the rule to find this complication. However, as we shall see, the converse is not true, for many cases of arterio-sclerosis were observed without evidences of nephritis.

In looking over the cases as a whole the highest pressure found—235 mm. Hg—was in a case in which the urine showed a specific gravity of 1014, with 10 per cent. of albumin without casts, but complicated by one of the most extreme degrees of arterio-sclerosis found. No doubt here the sclerosis was much more the cause of the high pressure than the nephritis, the patient being comparatively comfortable in spite of it. This comparative comfort was usual in the arterio-sclerosis cases.

The lowest mean arterial pressure seen in this class was 85 mm. Hg, and was in a case of chronic diffuse nephritis in which the urine examination was quite unexpected. The specific gravity ranged from 1012 to 1031; the albumin 60 to 99 per cent., with a few hyaline and granular casts, and the patient passing 41 to 104 ounces of urine in the twenty-four hours. Here, however, the arterio-sclerosis was very slight; but it shows that a low arterial pressure may accompany a nephritis of considerable extent. In only one case of the series was the pressure found lower, and that was in the case already referred to with pericarditis, rheumatism, and anæmia—pressure 82 mm. Hg. In the acute case as well the arterio-sclerosis was extremely slight.

A comparison of the pressures in these cases of chronic nephritis with those found in the acute condition shows the highest and average mean arterial pressure to be much higher in the former, the average mean arterial pressure being 62 mm. Hg higher in the chronic form. There is comparatively little difference in the lowest pressures to be found in each, either complicated or uncomplicated (arterio-sclerosis is ignored as a complication in this connection).

After careful examination of the data it is found that blood-pressure, urine examination, and the amount of arterio-sclerosis seem to bear no definite relation to each other beyond the fact that marked arterio-sclerosis complicating the nephritis increases the pressure.

Chronic Nephritis—Cases of Special Interest.

CASE L. was of interest as showing the lowering of blood-pressure during the period of apnœa in a patient with Cheyne-Stokes respiration in the terminal stages of chronic nephritis with chronic uræmia. Pressure after several deep inspirations, 140 mm. Hg; during apnœa, 125 mm. Hg. This difference was also appreciable to the finger, although the exact amount could not be accurately gauged in that way.

CASE LXXIX. illustrates the low pressure in cases of aortic regurgitation complicated by chronic nephritis. Patient, aged forty-five years; suffering from chronic nephritis. Urine: specific gravity, 1017; 20 per cent. albumin; granular and hyaline casts. Pressure, 85 mm. Hg. As will be shown under "Endocarditis," low pressure is the rule for aortic regurgitation, with or without nephritis or other complications, save where there is an accompanying mitral regurgitation.

CASE LXXXIV.—Acute pericarditis and articular rheumatism. Chronic nephritis; anæmia. Blood-pressure, 82 mm. Hg. Pericardium tapped; 3 ounces of bloody fluid obtained. After tapping, pressure 82 mm. Hg. No effect on blood-pressure whatever.

Under heading on "Effect of Drugs" other points of interest about these cases of chronic nephritis will be brought out.

II. ARTERIO-SCLEROSIS WITHOUT NEPHRITIS.

		All 18 cases.	*7 uncomplicated cases.*
Slight arterio-sclerosis 18 cases. 36 observations and readings.	Highest mean arterial pressure,	128 mm. Hg.	122 mm. Hg.
	Lowest " " "	80 " "	104 " "
	Average " " "	107 " "	112 " "
		All 14 cases.	*7 uncomplicated cases.*
Moderate arterio-sclerosis 14 cases. 28 observations and readings.	Highest mean arterial pressure,	180 mm. Hg.	125 mm. Hg.
	Lowest " " "	80 " "	108 " "
	Average " " "	107 " "	116 " "
		All 4 cases.	*2 uncomplicated cases.*
Marked arterio-sclerosis 4 cases. 43 observations and readings.	Highest mean arterial pressure,	205 mm. Hg.	205 mm. Hg.
	Lowest " " "	130 " "	138 " "
	Average " " "	165 " "	174 " "

Total averages for the thirty-seven cases of arterio-sclerosis of all degrees without nephritis: highest, 205; lowest, 80; average, 131 mm. Hg.

The divisions into slight, moderate, and marked arterio-sclerosis are, of course, merely arbitrary and determined by touch, and as such cannot be supposed to be exact; but after feeling a great many vessel walls one naturally divides the relative amount of thickening into these three classes, and although the limits of each are not clear-cut, still for practical purposes they are accurate enough.

By uncomplicated cases are meant all cases of arterio-sclerosis pure and simple, without acute conditions or valvular endocardial lesions, both of which are found at times to modify the arterial pressure.

A ready comparison may be made of arterial pressure between these classes of cases taken as a whole, or the uncomplicated alone, on referring to the foregoing classification. Referring only to the uncomplicated cases in each class, it is easily seen that the highest mean arterial pressure of cases with slight or moderate arterio-sclerosis is practically the same, the variation being only 3 mm. Hg in favor of the latter; the same holding true for the lowest and average pressures of the two classes, the average pressure in both being practically that of the normal individual. On the other hand, when we look at the pressures of the cases with marked arterio-sclerosis we see a great increase in all three, the average pressure being 58 to 62 mm. Hg higher than in the cases with a slight or moderate sclerosis. This is such a definite fact that it may with safety be laid down as a rule, that it is only an arterio-sclerosis of marked degree that, unaided by other conditions, increases to any extent the blood-pressure in the peripheral circulation. The same increase is shown in the cases taken as a whole, complicated and uncomplicated alike.

This failure of slight or moderate sclerosis to modify the arterial pressure was also shown in the cases of acute nephritis, to which the reader is referred.

The general idea gained in looking over standard works which treat of circulatory conditions in disease is that arterial thickening in general causes an increase in the blood-pressure of the individual—*i. e.*, no distinction is made as to the amount of the sclerosis necessary to cause such a result. This may be true theoretically, and to some extent practically, so far as the internal blood-pressure is concerned, but as yet we have no means of estimating such a condition if it really exists; certainly the peripheral blood-pressure is not materially increased except in cases in which the sclerosis is extreme. The number of cases of slight or moderate arterio-sclerosis in this series seems large enough to formulate the foregoing rule with safety. Those cases which were of especial interest in these classes will be discussed under the head of their associated complications. None of the cases of straightforward, uncomplicated arterio-sclerosis were of particular interest.

III. EFFECT OF SOME DRUGS AND PROCEDURES USED IN THE REDUCTION OF INCREASED ARTERIAL PRESSURE.

Clinically, the effects of medication are often perfectly plain, and we do not need the evidence of any new method, such as sphygmometry, to convince ourselves that certain arterio-dilators do good under certain conditions associated with increased peripheral blood-pressure. What is of interest, however, in this connection is:

1. How much effect do these drugs really have, measured by some definite means?
2. How promptly do they act?
3. How long does their action continue?

As this series of experiments is only meant to be a contribution to the study of the effects of some of the arterio-dilators, exhaustiveness is not claimed, but further knowledge is to be gained by future investigation.

It has been a difficult matter to determine satisfactorily, in many instances, what particular drug had the most marked effect in the reduction of blood-pressure, even with the aid of an instrument, and the results of observation here given have been determined with much difficulty. In order to obtain results as uniform as possible, with few exceptions the observations were made at the same time of day, viz., between 2 and 5 P.M., so that taking of food, exercise, etc., should not play a rôle in the variations, the patients being at rest in bed.

As will be seen by reference to the tables, the promptness of the drug's action and its duration was noted, while in others the general continued effect was observed. It has also been attempted to show the direct effect of medication and the pressure before administration of the drug; afterward the length of time before the maximum effect was produced, the duration of effect of a single dose, and any clinical points of interest about the cases, drawing conclusions, so far as possible, as to efficacy.

Erythrol Tetranitrite. In two cases the drug was given by the mouth, ½ grain t. i. d.

First case, marked arterio-sclerosis. Pressure before administration, 150 mm. Hg; after twenty-four hours' use, pressure 140 mm. Hg.

Second case, chronic nephritis, with marked arterio-sclerosis. Pressure before, 145 mm. Hg; after twenty-four hours' use, pressure 135 mm. Hg.

Erythrol tetranitrite reduced pressure in each case 10 mm. Hg. The drug is too expensive for general use and not as effectual as sodium nitrite.

NITROGLYCERIN. SERIES OF TWELVE CASES.

No.	Diagnosis.	Dose of nitroglycerin.	How given.	Pressure before.	Pressure after.	Effect noted in	Amount.	Effect lasted	Pressure returned to	Urine examination.	Amount of arterio-sclerosis.
1	Chronic nephritis, acute exacerbation,	Gr. $^1/_{000}$ every 2 hrs.	By mouth	155 mm. Hg.	125–180 mm. Hg.	Within 24 hours.	25–30 mm. Hg.	Continued to fall during convalescence.	....	1023, 25 per ct. casts; 1020, 2 per ct. in two days.	Slight.
2	Acute nephritis,	Gr. $^1/_{100}$ every 2 hrs.	Hypo.	155 " "	130 mm. Hg	Within 24 hours.	25 mm. Hg.	Four days, while on drug.	Continued to fall.	1025, 60 per ct. blood casts; 1010 trace casts.	None.
3	Abdominal tumor,	Gr. $^1/_{100}$ onco.	Hypo.	122 " "	115 " "	9 min.	7 " "	1½ hours.	Not seen.	1021, o. k.	None.
4	Acute nephritis,	Gr. $^1/_{60}$ once.	By mouth.	118 " "	105 " "	20 "	13 " "	1 hr. 20 min.	115 mm. Hg.	1018, 2 per ct. casts and blood.	Slight.
5	Cirrhosis of liver,	Gr. $^1/_{50}$ once.	By mouth.	115 " "	110 " "	15 "	5 " "	About 1 hour.	115 " "	1015, hyaline casts.	Slight.
6	Chronic nephritis, acute exacerbation,	Gr. $^1/_{50}$ once.	Hypo.	150 " "	135 " "	15 "	15 " "	1 hour.	150 " "	1020, 80 per ct. casts and blood.	Slight.
7	Lobar pneumonia, chronic nephritis.	Gr. $^1/_{100}$ once.	By mouth.	150 " "	150 " "	None.	0	0	....	1017, 30 per ct. casts.	Moderate.
8	Marked arterio-sclerosis,	Gr. $^1/_{100}$ once. Gr. $^1/_{100}$ every 1 hr.	Hypo Mouth.	200 " " 200 " "	200 " " 200 " "	None. None.	0 0	0 0	....	1026, negative.	Marked.
9	Chronic nephritis,	Gr. $^1/_{100}$ every 2 hrs.	Hypo.	122 " "	122 " "	None.	0	0	....	1020, 5 per ct. casts.	Moderate.
10	Gastroduodenitis, jaundice,	Gr. $^1/_{50}$ once.	By mouth.	105 " "	105 " "	None.	0	0	....	1020, negative.	None.
11	Lobar pneumonia,	Gr. $^1/_{100}$ every 4 hrs.	By mouth.	108 " "	111 " "	None.	0	0	....	1030, negative.	Slight.
12	Chronic nephritis,	Gr. $^1/_{100}$ every 2 hrs.	By mouth.	112 " "	112 " "	None.	0	0	....	1016, 30 per ct. casts.	Moderate.

Conclusions. 1. Continued effect of $\frac{1}{100}$ grain, by the mouth or hypodermically, results in lowered pressure, sometimes very good, and reduction may be greater than after a single dose under similar conditions. This is a fact in clinical experience where tension is high—*e. g.*, Cases I and II.; uncertain where tension is moderate—*e. g.*, Case IX.

2. The direct effect of a single dose of $\frac{1}{100}$ grain hypodermically is uncertain, sometimes resulting in moderate reduction of pressure—*e. g.*, Case III.—or is ineffectual. Case VII. (here the patient died in uræmic convulsions, phlebotomy even failing to reduce pressure).

3. The direct effect of a single dose of $\frac{1}{50}$ grain is reliable, with moderate lowering of pressure—5 to 15 mm. Hg.—in fifteen to twenty minutes. The promptness of action is about the same whether given by the mouth or hypodermically—*e. g.*, Cases IV., V., and VI.

4. The average duration of the positive effect from any dose is one hour and twelve minutes. No lowering of pressure when increase is due to marked arterio-sclerosis, either by a single dose of $\frac{1}{100}$ grain hypodermically or continued every hour by the mouth—*e. g.*, Case VIII. When pressure is already subnormal no further lowering follows the use of a single dose of grain $\frac{1}{100}$, or every two hours or every four hours—*e. g.*, Cases X., XI., and XII.

Résumé of Cases Given Sodium Nitrite. Dosage, ½ to 3 grains, always by the mouth.

Case XIII.—Most marked reduction of pressure in case of extreme arterio-sclerosis—50 mm. Hg. (This was repeated with identical results.)

Taking the other cases with positive results we find: Pressure lowered 10 to 15 mm. Hg; average, 12.2 mm. Hg. Effect evident in ten to fifty minutes; average, twenty-six minutes. Effect lasted one and a half to two hours; average, one hour and forty minutes.

The cases were acute or chronic nephritis, with more or less arterio-sclerosis, and one case of marked arterio-sclerosis without nephritis. One negative result. The case was a chronic nephritis, with an acute exacerbation and uræmic convulsions, and required phlebotomy, sodium nitrite having no effect.

Conclusions. Sodium nitrite reduces arterial pressure promptly, and is usually best given in doses of 2 to 3 grains every two to four hours, depending on the urgency of the symptoms. According to these experiments this is the most satisfactory and reliable arterio-dilator, and acts whether the increased pressure is due either to nephritis or arterio-sclerosis. As with nitroglycerin, continued use in some cases shows greater effect than a single dose. No depressing effects on the patient's general condition were seen.

Potassium Iodide. Four cases tested. Dosage, 10 grains t. i. d. in three cases, and 5 grains every four hours in one case. No effect from either could be discovered by the sphygmometer.

Sodium Nitrite. Series of Eleven Cases.

No.	Diagnosis.	Dose of sodium nitrite.	How given.	Pressure before.	Pressure after.	Effect noted in	Amount of reduction.	Effect lasted	Pressure returned to	Urine examination.	Amount of arteriosclerosis.
13	Marked arteriosclerosis,	Gr. ij every 4 hrs.	By mouth.	200 mm. Hg.	150 mm. Hg.	Within 4 hours.	50 mm. Hg.	While taking drug.	200 mm. Hg. 8 hrs. after last dose.	1026, negative.	Marked.
14	Normal case,	Gr. j every 4 hrs.	" "	110 " "	95 " "	8 hrs after first dose; not seen before.	15 " "	Not noted.	....	1032, negative.	Moderate.
15	Acute nephritis,	Gr. ij once.	" "	125 " "	112 " "	30 minutes	13 " "	2 hours.	125 mm. Hg.	1011 trace alb. gran. casts.	Moderate.
16	Acute nephritis,	Gr. ij once.	" "	128 " "	112 " "	50 "	13 " "	2 hours.	128 " "	1011, trace, casts.	Moderate.
17	Acute nephritis,	Gr. ij once.	" "	128 " "	112 " "	10 "	13 " "	1 hr. 50 min.	128 " "	1027, 3 per ct. albumin, hyal. casts.	Slight.
18	Chronic nephritis,	Gr. ½ once.	" "	122 " "	110 " "	15 "	12 " "	1 hr. 30 min.	Not noted.	1013, 3 per ct. albumin, no casts.	Moderate.
19	Chronic nephritis,	Gr. iij once, & every 4 hs.	" "	155 " "	140 " "	26 "	15 " "	1 hr. 30 min.	155 mm. Hg.	1017, trace, no casts.	Marked.
20	Chronic nephritis, acute exacerbation,	Gr. ij every 4 hrs.	" "	155 " "	155 " "	0	....	....	....	1023, 75 per ct. albumin, casts.	Slight.
21	Chronic nephritis,	Gr. iij once, & every 4 hs.	" "	150 " "	140 " "	15 minutes	10 mm. Hg.	1 hr. 35 min.	150 mm. Hg.	1035, 5 per ct. casts.	Moderate.
22	Chronic nephritis,	Gr. ij every 4 hrs.	" "	150 " "	140 " "	Not seen until next day.	10 " "	....	....	1015, 35 per ct. casts.	Moderate.
23	Chronic nephritis,	Gr. ij every 4 hrs.	" "	122 " "	110 " "	Not seen until second day.	12 " "	While taking drug.	....	1020, 5 per ct. albumin casts.	Moderate.

Chloral Hydrate. Three cases tested. Dose, 5 grains every four hours in all the cases. Diagnosis: Marked arterio-sclerosis; acute nephritis; chronic nephritis. No effect could be discovered. Tests were not conclusive.

Spiritus Etheris Nitrosi. Two cases. Dosage, ½ drachm, every four hours. No effect discovered.

PHLEBOTOMY AND INTRAVENOUS INFUSION OF HOT NORMAL SALT SOLUTION. TABLE OF FIVE CASES.

No.	Diagnosis.	Am't of blood withdrawn.	Am't of saline infusion.	Pressure before the operation	Pressure after the operation	Amount of fall in the blood pressure.	Remarks and notes on cases.
29	Chronic nephritis.	Oz. v.	1500 c.c. at 114° F.	200 mm. Hg.	150 mm. Hg. next day.	50 mm. Hg.	Marked general improvement; urine 1019, 30 per cent. albumin; casts.
66	Chronic nephritis.	Oz. viij.	1400 c.c.	195 mm. Hg.	150 mm. Hg. 3 days later.	45 mm. Hg.	Marked general improvement; urine 1013, 5 per cent. albumin; casts.
97	Chronic nephritis, marked arterio-sclerosis.	Oz. viij.	1200 c.c.	180 mm.	170 mm. next day.	10 mm. Hg.	The extreme arterio-sclerosis probably had much to do in preventing more complete fall of pressure; clinically patient much better next day, although tension still high.
40	Chronic nephritis.	Oz. vj.	1500 c.c.	122 mm.	122 mm. 6 hours after.	0	General condition much improved. although tension not lowered; urine 1020, 5 per cent. hyal. and gran. casts.
31	Chronic nephritis, convulsions.	Oz. xv.	1500 c.c.	125 mm.	125 mm.	0	Condition improved, though pressure not lowered; urine 1016, 20 per cent. alb.; red-cells.

Conclusions. Phlebotomy and saline infusion are good in all cases with markedly increased tension and where patient's condition is serious as a result of uræmic poisoning. In some cases blood-pressure is decidedly lowered, and in all there is marked improvement in the patient's general condition, even where no lowering of blood-pressure can be detected.

Effect of Extract of Suprarenal in Increasing Blood-pressure. Six cases. Dose, 5 grains, t. i. d. and every four hours. Results were the same in either dosage. Positive results in five cases. Pressure increased 2 to 10 mm. Hg; average, 6.6. mm. Hg. The effect was usually evident after two doses had been taken, and lasted while the drug was exhibited. One negative result. Case received 5 grains t. i. d. and every four hours. No effect was discovered, although the drug was continued for five days. In all these cases the blood-pressure was normal or subnormal before medication.

The positive effects of extract of suprarenal in increasing the blood-pressure are sufficiently marked to open the way for a wider field of usefulness for the drug in conditions representing a lowered vascular tone. Its local effects are so well known that nothing need be said for its local vasoconstrictor stimulative power, but much wider experiment is needed to decide of just how much use it can be in conditions where it is desirable to increase the general blood-pressure.

IV. NOTES ON BLOOD-PRESSURE IN VARIOUS DISEASES OTHER THAN NEPHRITIS OR ARTERIO-SCLEROSIS.

Endocarditis—Valvular Lesions. One learns very little in regard to the working capacity of the heart by sphygmometry; and in no way can the sphygmometer compare with the sphygmograph for this purpose, for it is remarkable how serious a valvular lesion may exist and how desperately ill a patient may be and still have practically a normal blood-pressure. A striking example of this was a patient with double aortic lesion and mitral insufficiency, who was clinically in great distress, sitting upright in bed, breathing with difficulty, the heart markedly dilated and hypertrophied, in whom the arterial pressure was 115 mm. Hg—*i. e.*, normal.

The two points worthy of mention under this heading are: 1. The low pressure seen in cases of aortic regurgitation uncomplicated by any mitral lesion. Three cases of this kind were observed with pressures of 80, 85, and 85 mm. Hg, respectively; the regurgitation was undoubted. 2. The compensation (so far as pressure is concerned), in some cases of aortic regurgitation, by a mitral insufficiency.

Cases with aortic regurgitation and mitral insufficiency: (1) One with mean arterial pressure of 115 mm. Hg. (2) One with mean arterial pressure of 110 mm. Hg. (3) One with mean arterial pressure of 155 mm. Hg (complicated by nephritis).

The last case shows that the blood-pressure may be even away above normal in these cases if complicated by nephritis.

Lobar Pneumonia. There were twelve cases observed, and notes on pressure of the blood taken on the second, third, fourth, fifth, sixth, seventh, eighth, ninth, and tenth days. Nothing definite was discovered in regard to a continued rise or fall of pressure during the progress of the disease. Cases which showed a low pressure after the crisis (and this was quite frequently true) also showed a steady rise to normal pressure during convalescence. Observations of prognostic value were not made.

Anæmia (Primary). It was an interesting fact noted in this class that the blood-pressure was almost invariably lowered unless complicated by a nephritis or marked arterio-sclerosis. This is quite contrary to such authority as Oliver, who states that in chlorosis and anæmia mean arterial pressure is, as a rule, raised, but the rise is generally but moderate in degree.[1]

TABLE OF CASES OF ANÆMIA.

Case.	Hæmoglobin.	Complication (if any).	Mean arterial pressure.
1	60 per cent.	Gastric ulcer	82 mm. Hg.
2	62 "	Acute rheumatism	82 " "
3	40 "	Gastric ulcer	84 " "
4	65 "	Gastric ulcer	85 " "
5	48 "	None	85 " "
6	65 "	None	85 " "
7	55 "	Gastric ulcer	85 " "
8	60 "	None	95 " "
9	65 "	None	95 " "
10	40 "	Gastric ulcer	95 " "
11	60 "	Catarrhal jaundice	105 " "
12	45 "	Gastric ulcer and acute nephritis	108 " "
13	85 "	None	110 " "

The only exception to this almost invariable rule of low pressure associated with anæmia is in Case XIII., and here the hæmoglobin was 85 per cent., or at least 20 per cent. higher than in any of the other cases; this percentage of hæmoglobin is so nearly that which is ordinarily found in most individuals as normal that it seems fair to class it as such. The accompanying nephritis in Case XII. accounts for the pressure—108 mm. Hg—with low hæmoglobin. No accurate relation between the amount of hæmoglobin and the mean arterial pressure could be discovered.

Gastric Ulcer. There were five cases of this condition observed, all complicated by a greater or less degree of anæmia. The blood-pressure ranged from 82 mm. Hg to 100 mm. Hg, the average being 87 mm. Hg. The hæmoglobin, estimated by Von Fleischl method, ranged from 55 per cent. to 70 per cent., the average being 67 per cent.

The thought which naturally arises in this connection is: Could not the lowered pressure, which we find almost always accompanies an anæmia, be a factor in the production of gastric ulceration? for, as is well known, nearly all the cases of ulceration show signs of anæmia before the symptoms of ulceration develop; at least, it seems that this may in some cases be proved to play a rôle in the production of gastric ulcer—*e. g.*, lowered pressure in the capillaries of the mucosa, partial or complete stasis in some, and diminished vitality of the part, with autodigestion at this point, resulting in ulceration.

No mention of such etiological factor can be found in any of the numerous general and special treatises on the subject consulted, but it offers at least a field for investigation.

Typhoid. Three cases. All showed lowered pressure when accompanied by high temperature.

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[1] G. Oliver. Blood and Blood-pressure, 1901, p. 261.

Other Cases Noted. Trichinosis; cirrhosis of liver; acromegaly; Raynaud's disease; epilepsy; bronchitis, with or without asthma; rheumatism, acute or chronic; rheumatic purpura; tertian malaria; tubercular peritonitis; sciatica. In none of these cases was there anything abnormal found in regard to blood-pressure.

V. Résumé and Conclusions.

1. Average normal mean arterial pressure is: males, 116 mm. Hg; females, 113 mm. Hg.
2. In acute nephritis the accompanying arterio-sclerosis, if present, is of slight or moderate degree.
3. In acute nephritis the height of the blood-pressure varies, for the most part, directly with the amount of albumin in the urine.
4. An acute parenchymatous nephritis complicating an acute infectious disease causes little or no increase in blood-pressure.
5. The average mean arterial pressure in chronic nephritis is about 62 mm. Hg higher than that of acute nephritis.
6. There were no cases of chronic nephritis seen without an accompanying arterio-sclerosis.
7. In arterio-sclerosis it is only those cases in which it is extreme that the average mean arterial pressure is raised.
8. The most satisfactory drug for lowering blood-pressure, whether increase is due to nephritis or marked arterio-sclerosis, is sodium nitrite, best given in 2 to 3 grains every two to four hours. It acts in about twenty-six minutes, causing a reduction of 10 to 15 mm. Hg (in marked arterio-sclerosis sometimes much more), the effect lasting one hour and forty-four minutes on the average.
9. When the blood-pressure is high and is accompanied by symptoms of uræmia the best method of rapid reduction is phlebotomy—5 to 8 ounces, followed by saline infusion (1400 to 1500 c.c. of hot normal salt solution) and sodium nitrite in full doses. Clinically, also, there is almost invariably improvement.
10. Blood-pressure in aortic regurgitation, whether complicated by nephritis or not, is low. If a mitral regurgitation is also present pressure may be nearly normal.
11. Blood-pressure in all forms of anæmia is below normal.
12. Possible relation between lowered pressure in chlorosis and the production of gastric ulcer.

It is with a sense of the author's heartiest appreciation that he acknowledges the kindness of the medical attending and house staff of the Presbyterian Hospital, New York, for their co-operation in carrying out these experiments in the wards of that hospital; with especial thanks to Prof. Walter B. James and Dr. John S Thacher, for their aid and encouragement in completing the work.

REVIEWS.

THE DISEASES OF THE RESPIRATORY ORGANS, ACUTE AND CHRONIC. By WILLIAM F. WAUGH, A.M., M.D., Professor of Practice and Clinical Medicine, Illinois Medical College, etc. Pp. 221. Chicago: G. P. Engelhard & Co., 1901.

A SMALL book, and one containing in its preface indications that the author possesses a virile belief in the efficacy of remedial measures, attracts attention. A belief that the function of the physician is neither one of expectancy nor yet of passive acquiescence in the natural progress of disease is hopeful, particularly when the method of intervention is not only clearly stated, but with its statement is given the reason for its recommendation. Without criticism of occasional printer's errors, the absence of index, infrequent vernacular in place of scientific diction, and even passing by some inconsistencies in text, we would call attention to the evidence, which the work contains, of positively good results to be obtained by the author's method as here exemplified. There is evidence that the book is written from the stand-point of the physician, realizing his responsibilities as well as his limitations, and not as indicative of a burning desire for literary fame. Of practical therapeutic indications the volume contains a host; of important, even if secondary, matters for attention, it is replete with suggestion. If we might join issue with the writer, we would suggest that with some potent remedies, of rather slow elimination, the dose-interval might be very properly prolonged in the interest of the patient. While we are given to understand that this is not to be regarded as "a finished product," when a more substantial work is presented we are inclined to believe that much more than "a stick may be retained in the final structure." We are to regard this only as a foundation upon which the author may erect a more thorough, a more complete, and, quite likely, a more æsthetic superstructure. R. W. W.

A TREATISE ON ORTHOPEDIC SURGERY. By ROYAL WHITMAN, M.D., Chief of the Orthopedic Department of the Vanderbilt Clinic in the College of Physicians and Surgeons of Columbia University, etc. Illustrated by 447 photographs. Philadelphia and New York: Lea Brothers & Co., 1901.

THE author wastes no time in definition of orthopedic surgery or with general introduction to the subject, but plunges at once into a discussion of the conditions generally treated of under this head, and the first chapter is devoted to Tubercular Disease of the Spine. This general subject is treated by regions, the spine being divided for the purpose into the lower, middle, and upper regions, with suitable treatment for lesions in each section. The complications of spinal tuberculosis are admirably dealt with, the author believing, for instance, that if abscess is not present when treatment begins one may hope to ward it off by suitable measures. Dealing with the subject of abscess, he evidently recognizes the difficulty of treating such cases radically, and yet is nevertheless more of a friend of operative intervention than are many of the so-called orthopedists, in which he shows a much riper surgical judgment. He advises against operation in the paraplegia of Pott's disease, his experience having shown its dangers as well as the safety, even if the tediousness, of non-operative treatment. He speaks kindly of Calot's forcible correction method for the deformity of Pott's disease, and describes it in detail. His plan of gradual correction is also given at considerable length and in most admirable manner. In the second chapter Non-tuberculous Affections of the Spine are fully considered, including syphilis, actinomycosis, acute osteomyelitis, and rickets. One of the most valuable portions of the book is that devoted to painful affections of the spine not attended by any deformity, such as those which result from typhoid fever and gonorrhœa, including, also, arthritis, spondylitis deformans, and particularly those painful affections which are not even attended by rigidity, such as the neuroses.

The subject of lateral curvature of the spine is well dealt with, these curvatures being classified in eight different varieties, according to their etiology, which shows how closely the author has studied the clinical and etiological aspects of these cases. He not only does ample justice to but cordially commends Teschner's system of gymnastic treatment with dumb-bells, while not failing to describe other perhaps less violent methods. Chapter IV. deals with other deformities of the chest and spine, including Sprengel's deformity of the scapula, asymmetrical development, etc. Wolff's classical researches into the pathogenesis of deformity have also full justice done them. Chapter V. concerns Tubercular Disease of Bones and Joints. Enough is said of their pathology to show that the author is familiar with it, although much is left to the special text-books. In Chapter VI. non-tubercular diseases of the same structures are dealt with, including syphilitic and post-gonorrhœal, with other forms of infectious arthritis, osteoarthritis, scurvy, and Charcot's disease. Chapter VII. deals with Hip Disease. In considering its mechanical treatment he discusses fairly the relative merits of traction with and without rest—*i. e.*, in bed or in splints and braces. The next chapter deals with non-tubercular diseases of the same joint, while the following three chapters concern the other major articulations. Chapter XIV. deals with Congenital Dislocation of the Hip, the author being decidedly inclined to view the lesion as being due to a defect in development. He seems to favor operation in all cases where radical cure is desired, and describes the three operative methods, namely, the open (Lorenz), forcible replacement, and intermediate operation, claiming that the prospect of success is directly related to the age of the patient. Dr. Whitman would advise that in children under six there should be first tried the functional weighting method of Lorenz, which, if ineffectual, may be followed by the open operation. Coxa vara is naturally dealt with in the same chapter, his view being that it is best treated by linear, or, if necessary, by cuneiform osteotomy.

Chapter XV. concerns Deformities of the Legs, such as genu valgum and varum and bowlegs, and the ensuing chapter deals with those of the upper extremities; then come two chapters concerning the important subject of diseases of the nervous system, which so often and so unfortunately lead to deformity, including poliomyelitis, the various paralyses, muscle dystrophies and atrophies, and hysterical and neurotic joints, the description and advice contained therein being of very great value. Chapter XIX. concerns the various forms of torticollis, the author giving exceedingly careful consideration to the indications for and the performance of the various operations called for in this condition. The concluding portion of the volume, some 140 pages, is given up to the various disabilities and deformities of the foot, including neuralgic affections and their especial treatment by improved footwear, and, in fact, comprising about everything that there is to be said in regard to these most annoying maladies.

One of the important features of the work as a whole is the not only frequent but judicious use made of statistics, the author seeming to have apportioned his space largely to the statistical importance of each subject dealt with. Such references as he makes to the surgical anatomy of parts involved are delightfully succinct and to the point, and of particular value is his enumeration of certain anatomical landmarks. Altogether, we know of no more admirable presentation of the salient practical points of orthopedic surgery than this volume affords, nor is there any work to which one may refer with more certainty of finding the latest and best. The author's large store of experience is evinced throughout the work, and his ripe judgment is especially that which makes the work so commendable. R. P.

THE TREATMENT OF FRACTURES. By W. L. ESTES, A.M., M.D., Director and Physician and Surgeon-in-chief of St. Luke's Hospital, South Bethlehem, Pa. Published by the International Journal of Surgery Co., 100 William Street, New York.

THIS book, which presents a large personal experience with fractures, possesses practical points of value not to be found in many of the more extensive works on this subject. The author shows and teaches a proper consideration of the patient's suffering, and constantly tells the attendant how this may be avoided or relieved—advice which is very much needed by the beginner. At the same time the most thorough methods of reduction and dressing are recommended. The pages devoted to "first aid, etc.," might be read with profit by everyone.

The author is an ardent advocate of plaster-of-Paris wherever it is possible to use it, and of its early application. We can hardly agree with him, however, as to the best time at which to begin massage and passive motion. This is a much-debated question, but the advocates of early motion and massage are certainly increasing in number every day. We feel confident that if early motion of muscles and joints were employed there would be a much earlier return of function than Estes is able to promise. This is particularly true of fractures near the wrist-joint.

The writer's attitude toward and experience with fractures of the spine in which the cord is injured is much in accord with that of the best authorities. A serious omission is that of the Jones dressing for fractures of the lower end of the humerus. The author recommends the early application in these cases of plaster-of-Paris from the fingers to the axilla, fixing the arm in a right-angle position. This dressing will not appeal to anyone who has employed the Jones position in the treatment of these fractures. We cannot commend the author's method of dressing a Colles fracture with plaster-of-Paris, although he does leave the fingers free and advises early motion of them This dressing he leaves undisturbed for two weeks, which we are inclined to think is bad treatment of the wrist-joint and its neighboring tendons.

As a piece of bookmaking we regret that we can say nothing commendatory, since the binding is poor and the type too small.

J. H. G.

PATHOLOGICAL TECHNIQUE. A PRACTICAL MANUAL FOR WORKERS IN PATHOLOGICAL HISTOLOGY AND BACTERIOLOGY, INCLUDING DIRECTIONS FOR THE PERFORMANCE OF AUTOPSIES AND FOR CLINICAL DIAGNOSIS BY LABORATORY METHODS. By FRANK BURR MALLORY, A.M., M.D., Assistant Professor of Pathology, Harvard University Medical School; First Assistant Visiting Pathologist to the Boston City Hospital; Pathologist to the Children's Hospital and to the Carney Hospital; and JAMES HOMER WRIGHT, A.M., M.D., Director of the Clinico-Pathological Laboratory of the Massachusetts General Hospital; Instructor in Pathology, Harvard University Medical School. Second edition, revised and enlarged. Pp. 432, with 137 illustrations. Philadelphia and London: W. B. Saunders & Co., 1901.

THE second edition of this justly prized manual shows considerable improvement over the first. The book is larger by 35 pages, the illustrations have been increased from 105 to 127, some sections have been rewritten, a number of new methods have been added, and some of the old methods have been revised. Among the important alterations are the amplification of the description of the parasite of actinomycosis, and the insertion of descriptions of the bacillus of bubonic plague, of the parasite of mycetoma (Madura foot), and of Wright's methods for cultivating anaërobic bacteria. Among the important additions are new staining methods for elastic tissue, by Weigert; for bone, by Schmorl, and for connective tissue, by Mallory. Most of the new illustrations are reproductions of photomicrographs of different bacteria. While it is distinctly stated in the preface that no attempt has been made to include in the book all methods and formulæ, but rather to exercise discrimination, and to select only those methods and formulæ that either have stood the test of practical experience or give promise of great usefulness, the book would have been made even better than it is had this rigidity been tempered a little by including more details of the Rokitansky method of performing necropsies, Jenner's blood stain, methods other than von Fleischl's for determining the percentage of hæmoglobin in the blood, details for detecting typhoid bacilli in the urine, Lubarsch's gentian violet method for demonstrating glycogen in tissues (especially as Lubarsch's less reliable iodine-hæmatoxylin method has been incorporated in this edition), etc. These, however, are details. On the whole the book is most praiseworthy. It is a book that no one interested in pathological histology and bacteriology can well do without—a book than which there is no better on pathological technique. A. O. J. K.

INTERNATIONAL CLINICS. Edited by HENRY W. CATTELL, A.M., M.D., Philadelphia, U. S. A. Vol. II. Eleventh series. Pp. viii., 304. Philadelphia: J. B. Lippincott Co., 1901.

WE have on several occasions reviewed the different volumes of this series. The present contains important papers on locomotor ataxia, by Fournier, Frenkel, and Starr. A theoretical discussion entitled "Some Suggestions as to the Mechanism of Mental Operations," by Ramon y Cajal, completes the contributions to neurology. In medicine "Smallpox," by Schamberg, illustrated by several excellent plates, is not only timely, but valuable in its suggestions and presentation. Douglas reviews the causation and treatment of various hemorrhages, systematizing our knowledge, but without introducing any novel features. In Surgery, Deaver presents a miscellaneous article dealing with important topics, while Wathen contents himself with carefully reporting a single instance of splenectomy. The single paper on pediatrics is one on "Acute Dilatation of the Heart," by Blackader, which is characteristically readable and thorough. Casselberry, reporting on adrenalin, covers very thoroughly the field of use in this very important addition to our therapeutic resources. A notable paper by Shoemaker, "A Study of the Especial Ocular Signs Found in States of Unconsciousness," appeals rather to the physician than to the ophthalmic surgeon, but is worthy of careful study by both. In therapeutics we find several important topics ably presented. Tuffier's rather optimistic paper on "Surgical Analgesia by Injections of Cocaine into the Spinal Column," and Doléris on the "Oxytocic Effect of the Lumbar Injection of Cocaine, Particularly to Induce Labor," thoroughly cover questions which have recently become prominent. The marked results obtained by this method not only give the practitioner aid in time of need, but also warn us of danger when it is employed in general surgery. Other excellent articles are those by Jardine, Chaulford, and Broca. The volume concludes with the pronunciation and definition of some of the newer medical words, by Dorland. This is timely, in view of the rapid extension of medical nomenclature, and withal appalling in the torture to which classical Latin and Greek are put. As is apparent to the reader, this volume is well abreast of its predecessors in practical value and extent of information. R. W. W.

PROGRESS
OF
MEDICAL SCIENCE.

MEDICINE.

UNDER THE CHARGE OF

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The Juvenile Form of Progressive Paralysis.—Most authors understand by juvenile progressive paralysis cases in which the manifestations begin before the twentieth year. HIRSCHL (*Wiener klin. Wochenschrift*, 1901, Band xiv., p. 515), however, asserts that it would be wise to call juvenile only those cases which depend upon hereditary lues, in contradistinction to the progressive paralysis of adults, which is probably always preceded by an acquired lues.

In Krafft-Ebing's clinic 20 cases of juvenile progressive paralysis have been observed in the last ten years; 8 of these cases have been more or less fully described previously. In 17 of these instances hereditary lues was positively made out. Once a probable history was procured, while twice no evidence of lues could be obtained. In 1 of these two instances the mother probably died of general paralysis, while in the other nothing was known about the parents. In 9, or 45 per cent. of these cases, the patients were, from the onset, of feeble intellectual development, while several were also submicrocephalic; 12 of the patients were males, 8 females. The period of onset of the disease varied between the eighth and the twentieth year, figures which agree very markedly with those of Thiry's 69 cases. In most of the cases puberty had not been reached, and in those instances the patients retained during the whole course of the disease an infantile habitus. The condition began with psychical and physical symptoms, which were usually fairly well-marked; severe headache, attacks of vomiting, apoplectiform or epileptiform seizures, short lapses from consciousness, with slow recovery of speech, preceding characteristic disturbances of speech. Eye symptoms were common, as was also exaggerated knee-jerk. Irritative symptoms, tremor, and sometimes rhythmic movements of the upper extremities were common. In association with these symptoms, loss of memory and dementia rapidly developed. These symptoms gradually increased, the physical and psychical degeneracy progressing steadily. In all cases there was but a simple dementia, never maniacal or hypochondriacal delirium. Only once, at the height of the disease, were optical hallucinations observed. In the final stages of the disease the patients were, as a rule, confined to bed as the result of the paralytic manifestations in the extremities. The duration of the disease varied greatly, averaging about three and three-quarter years. The longest cases in Krafft-Ebing's clinic were two which lasted about seven years. An autopsy was obtained in twelve cases. There was a marked diminution in weight and size of the brain; the leptomeninges were strikingly thickened; there was granular ependymitis with chronic external and internal hydrocephalus; well-marked diffuse sclerosis. Microscopically, a well-marked leptomeningitis was to be made out as well as characteristic cerebral changes.

The author believes that the following differences exist between juvenile progressive paralysis and that of adults.

1. The congenital lues as cause of the juvenile paralysis.
2. The early age at the beginning of the disease.
3. The fact that commonly individuals of weak mental development fall a prey to this form of paralysis.
4. The prodromal stadium, rich in symptoms, which, in addition, is characterized by many paroxysms.
5. The fact that at the height of the disease there is, as a rule, only simple dementia, almost never a paralytic mania or a paralytic hypochondria; that at the height of the disease there are no remissions, and that irritative symptoms as well as paroxysms are very often met with.
6. The relatively long course of the disease.
7. The discovery of a diffuse cerebral sclerosis, with marked leptomeningitis, at autopsy.

A New Case of General Paralysis, with Hereditary Syphilis.—REGIS (*Arch. de Neurologie*, 1901, Band xi., 2 S., p. 449) describes a characteristic case of general paralysis developing in a young man with undoubted hereditary syphilis, at about the age of seventeen years. The course of development was that of a progressive dementia and gradually increasing enfeeblement of the intellectual faculties. The onset was gradual and the course progressive. Maniacal symptoms and hallucinations were entirely absent.

The Effects of the Growth of the Bacilli of Cholelithiasis in Bile.—During the last fifteen years numerous observers have called attention to the connection between infection of the contents of the gall-bladder with certain bacteria and the formation of gallstones. The causal relation between infection with the bacterium coli communis and the typhoid bacillus and cholelithiasis has especially been clearly shown. There is some reason to believe that the streptococcus pyogenes and the staphylococcus and, possibly, some other organisms may also play a slight part. There has been, however, considerable question as to the manner in which infection with these bacteria brings about the formation of the calculus. ITALIA (*La Riforma Medica*, 1901, Ann. xvii., ii., 830) has conducted a series of experiments in an endeavor to elucidate this point. The organisms with which he has worked were the bacterium coli communis, the typhoid bacillus, the streptococcus pyogenes, the staphylococcus aureus, and the bacillus subtilis (extracted from water). Ox bile, filtered and sterilized, was used as a medium. This always showed a marked alkaline reaction. The bacteria were first cultivated in a medium composed of bouillon and bile, and then transplanted to pure bile. Two different classes of results were obtained, one occurring when the colon bacillus and the typhoid bacillus were used, the other with the streptococcus and staphylococcus. The typhoid and colon bacilli grow rapidly in pure bile. The medium, however, becomes neutral in from twenty to thirty days, while in from fifty to ninety days a sediment begins to be precipitated. This sediment appears earlier, and is more abundant in cultures of the typhoid bacillus than in those of the colon bacillus. If instead of keeping the bacilli in the same medium several transfers are made, it will be noted that in the third or fourth transplantation into bile the reaction after a few days changes from alkaline to acid. If these bacteria are kept in bile sixty to ninety days the reaction of culture medium also becomes sharply acid. The sediment is found to consist of crystals of carbonate of lime laden with biliary pigments and crystals of cholesterin. It would then appear to be clear that the colon bacillus and the typhoid bacillus have the property of precipitating cholesterin when cultivated in bile. This Italia believes to be due to the acid reaction which is produced. Typhoid and colon bacilli cultivated in bile become rapidly attenuated. The staphylococcus aureus and streptococcus develop poorly in bile and never change the reaction of the medium, the cultures becoming sterile in from twenty-one to thirty days. Sometimes a gradual development of the organism may be made out, the streptococcus developing better than the staphylococcus, which requires from eight to fifteen days for scanty growths. Both of these organisms give rise to a sediment in the culture, which consists in greater part of phosphates and carbonate of lime. No cholesterin is present, and the sediment is very much scantier than that obtained with typhoid and colon bacilli.

The subtilis gives a scanty sediment and grows slightly in bile without altering its reaction. If the colon bacillus be added to a culture of staphylococcus or streptococcus it develops rapidly, and a more abundant sediment is deposited. This contains much biliary pigment and carbonate of lime, and, after from ten to fifteen days, cholesterin is also found. With the precipitation of the cholesterin the reaction of the bile is always found to be acid. It appears, therefore, that the colon bacillus develops more rapidly and better in mixed infections with the staphylococcus or streptococcus than alone.

The author concludes:

1. The bacterium coli communis and the bacillus of Eberth are the specific micro-organisms of cholesterin calculi.
2. The streptococcus pyogenes and the staphylococcus aureus may rarely be the cause of cholelithiasis; and, if a calculus should occur, this would consist solely of salts of lime, as the above-mentioned micro-organisms never determine the precipitation of cholesterin
3. If the bacterium coli communis be associated with the streptococcus

and the staphylococcus, their biochemical action takes place more rapidly in the bile; the calculi in this case will be mixed—that is, composed of cholesterin, salts of lime, and biliary pigment.

The Present Position of the Bacteriology of Rheumatic Fever.—POYNTON and PAINE (*British Medical Journal*, September 21, 1901, p. 779), in discussing again the etiology of rheumatic fever, assume the position that there is no question as to the microbic origin of the disease. They are of the opinion that in the study of the bacteriology of rheumatism sufficient care has not been shown in the selection of cases. They had used only cases of rheumatic fever in childhood in their investigations. By so doing they have materially diminished the possibility of mistaking cases of arthritis deformans and gout for rheumatism, the risk of which is considerable in adults.

The writers classify the views upon the bacteriology of rheumatic fever under five groups:

1. That rheumatic fever is the result of an infection with a diplococcus. The researches of von Leyden, Triboulet, Dana, Apert, Wassermann and Malakoff, and Fitz Meyer, as well as their own, have a special bearing on this view.

2. That it is the result of an infection with a specific anaërobic bacillus. Achalme, Thiroloix, and several French observers hold that the disease is due to such a bacillus, which is of large size and remarkably variable in its morphological characters. These investigators claim to have found the organism constantly and to have produced the disease experimentally in rabbits.

3. That rheumatic fever is not due to any particular micro-organism, but is a special reaction to varied infections. The writers do not think this view is entitled to more than passing mention.

4. That simple uncomplicated rheumatism, which reacts to salicylates, is due to some unknown virus, and the complications are the results of secondary infections, usually with cocci. The writers say that if one takes the rheumatic fever of childhood as the type it is difficult to say which lesions are to be considered as complications and which as a part of the disease itself. They are of the opinion that the so-called complications are due to the same organism as are the joint manifestations.

5. That rheumatism owes its origin to staphylococcal or streptococcal infection; that it is, in fact, an attenuated pyæmia due to pyogenic cocci. This view is advanced and strongly supported by Gustav Singer.

Singer has vigorously attacked Wassermann and Fitz Meyer, who claim that the diplococcus they have isolated is specific. Poynton and Paine, who are strong advocates of the diplococcus causation of rheumatic fever, vigorously oppose Singer's theory. Singer holds that rheumatic fever cannot be produced experimentally. They state that if he would grant such a possibility, then there would be some chance of proving or disproving his view, for if it is the correct one, it should be possible to attenuate a virulent culture of the streptococcus pyogenes or staphylococcus aureus in such a way as to produce with them experimental rheumatic fever; and, on the other hand, it should be possible to raise the virulence of cultures obtained from cases of rheumatic fever in such a way as to produce a septicæmia indistinguishable from that caused by virulent cultures of these pyogenic cocci. The writers have attempted to produce these results, but have failed.

Poynton and Paine have isolated a diplococcus in eighteen cases of rheumatic fever, and, owing to its constancy, think that they are justified in designating it as "diplococcus rheumaticus." They hold that the balance of evidence is strongly in favor of the view that rheumatic fever is due to a diplococcus infection. They hope that other investigators will eventually be able to support their view that there is a specific organism. If it be conclusively proven that there is such an organism, it may then be possible to isolate a specific toxin and eventually to manufacture a curative antitoxin.

SURGERY.

UNDER THE CHARGE OF

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The Cause of Diffuse Peritonitis Complicating Appendicitis, and its Prevention.—OCHSNER (*Journal of the American Medical Association*, June 22, 1901) states that in fatal cases of appendicitis the patient practically always dies as the result of a diffuse peritonitis. Other conditions may arise which may result in a fatal issue. There may be a septic thrombosis of the vessels in the vicinity of the appendix, or an empyema, or even pyæmia, but by far the greatest number of deaths occurs from diffuse peritonitis, and if it is possible to prevent this the mortality from appendicitis must at once fall enormously. There is the danger of the occurrence of diffuse peritonitis in the following classes of cases: 1. Gangrenous appendicitis. 2. Perforative appendicitis. 3. Cases in which the cæcal end of the lumen of the appendix is closed and the distal portion so thoroughly distended with septic material as to make its walls permeable to micro-organisms. 4. Those rare cases in which there are small abscesses in the walls of the appendix not directly connected with its lumen. 5. Those cases in which there is a septic thrombosis of some of the vessels, but not sufficient to cause gangrene. The infection of the general peritoneal cavity must occur from a disturbance on the part of the small intestines, and must be due to their peristaltic motion, so food and cathartics are absolutely contraindicated, and any portion of food which may be retained in the stomach at the beginning of the attack should be removed by gastric lavage. It may be necessary to perform gastric lavage twice, or at most three times, in order to entirely remove remnants of food which may have regurgitated into the stomach from the small intestines by reason of return peristalsis. This method of treatment has proved itself of the greatest value, especially in those cases where the appendix was gangrenous or perforated, and in which there was already a beginning general peritonitis.

The nausea and vomiting will cease after one or two, or at most three, gastric irrigations. The meteorism and the pain will decrease greatly during the first twelve hours, and will almost completely disappear in twenty-four hours. The pulse becomes slower and firmer and more regular, the breathing deeper, and the patient's general appearance improves to an astonishing extent. If the temperature is high it will go below 100° F. the first twenty-four hours, and in three days it will be practically normal. The abdominal muscles will become soft as soon as the stomach contents have been removed by gastric lavage.

The author has operated in this hospital upon 565 appendicitis cases, which he has divided into three groups: 1. Those who entered the hospital suffering from diffuse peritonitis. 2. Those who entered the hospital suffering from gangrenous or perforative appendicitis. 3. Those who entered the hospital suffering from recurrent appendicitis in the interval between attacks or at the beginning of a recurrent attack when the infectious material was still confined to the appendix. Of the first class he treated eighteen cases with ten deaths, 55.5 per cent. mortality; of the second class he operated upon 179 cases, with nine deaths, 5 per cent. mortality; of the third class he operated in 368 cases, with one death, ¼ per cent. mortality. Total, 565 cases, with twenty deaths, 3.5 per cent. mortality.

These statistics contain all patients who entered the hospital suffering from appendicitis, even those who died a few hours after admission from general peritonitis.

The author states in conclusion: 1. Peristaltic motion of the small intestines is the chief means of carrying the infection from the perforated or gangrenous appendix to the other portions of the peritoneum, changing a circumscribed into a general peritonitis. 2. This can be prevented by prohibiting the use of every kind of food and cathartics by the mouth, and by employing gastric lavage in every case in which there are remnants of food in the stomach or in the intestines above the ileocæcal valve, as indicated by the presence of nausea or vomiting or meteorism. 3. The patient can be supported by the use of concentrated predigested food administered as enemata not oftener than once in four hours and not in larger quantities than four ounces at a time. 4. This form of treatment, when instituted early, will change the most violent and dangerous form of acute perforative or gangrenous appendicitis into a comparatively mild and harmless form. 5. Cases of perforative or gangrenous appendicitis, with beginning general peritonitis, can usually be carried through the acute attack safely with this method. 6. In all cases of this class gastric lavage should be practised in order to prevent the absorption of decomposing material from the alimentary canal. 7. In cases of doubtful diagnosis this form of treatment should always be employed. 8. This treatment will prevent a large proportion of the most troublesome complications and sequels of appendicitis, such as ventral hernia, fecal fistulæ, extensive adhesions, etc. 9. The patient should be permitted to recover fully from his acute attack before an operation is performed, except in cases encountered within the first thirty-six hours after the beginning of an attack or in case of the formation of a superficial circumscribed abscess. 10. It often requires but a small amount of any kind of food to change a harmless circumscribed into a dangerous diffuse peritonitis. 11. The treatment does not protect the patient against a subsequent attack. 12. It does not contraindicate the removal of a diseased appendix before the septic material has extended beyond this organ. 13. It is indicated in all intra-abdominal conditions in which it is desirable to prevent the distribution of septic material by means of peristaltic motion. 14. The laity should be taught to stop feeding and giving cathartics to patients suffering from intra-abdominal diseases.

Hydatid Cyst of the Prostate.—BANGS (*Annals of Surgery*, May, 1901) reports the interesting case of a man, aged thirty-nine years, who presented himself for treatment for retention of urine. He was catheterized, and on the day of his admission to the hospital 162 ounces of urine were withdrawn. On emptying the bladder a large tumor was found in the hypogastrium, extending over into the left inguinal region. Examination for calculus was negative, but it showed the urethra to be ten and one-half inches in length. Rectal examination showed the prostate to be normal on the patient's right side, but the left lobe is round, much larger than the right, and its posterior and lateral margins cannot be defined from the mass in the pelvis, with which it seems to be continuous. Bimanual pressure moves the whole tumor, which is spherical in shape and somewhat elastic, but there is no sensation of fluctuation, fremitus, or ballottement. It seem to be connected with the prostate. An operation was decided upon, and a vertical incision was made in the median line from above the pubes nearly to the umbilicus. The tumor was adherent to the large iliac vessels and to the tissues of the pelvis. The tumor was aspirated, and about twenty-five ounces of fluid withdrawn. The tumor was then freely laid open, and was found to contain many secondary cysts, which were removed. As it was found impossible to remove the sac, therefore the edges of its opening were stitched with silk to the abdominal wall in the lower fifth of the incision, two drainage-tubes inserted in the sac, and the abdominal wound closed. Microscopical examination showed the presence of hooklets and many secondary cysts in the fluid evacuated from the tumor. The patient made an uninterrupted recovery. The author believes the case to be one of prostatic origin for the following reasons: 1. The length of the urethra, viz., ten and one-half inches, in a young man, aged thirty-nine years, in whom were no evidences of an inflammatory process. 2. The obstruction to urination was at the neck of the bladder and in the situation of the left lobe of the prostate, the latter being found to be asymmetrically enlarged. 3. The notable rotation toward the right of the beak of the searcher as it came in contact with the left lobe of the patient's prostate, and the left lateral deflection of the handle of the instrument to enable its distal end to curve around (so to speak) the obstruction. 4. The situation of the tumor as determined by digital examination by the rectum, as verified by two other observers; but this is admittedly inconclusive. 5. The findings at the time of the operation.

A search of the literature shows how few cases of this seat of hydatid cyst are on record. Out of twenty-three cases of hydatids of the pelvis tabulated by M. Nicaise (*Bulletin de la Société de Chirurgie*, in 1884), there are but seven which have any close relation to the prostate, and the diagnosis is so doubtful that Sir Henry Thompson does not hesitate to say: "It is doubtful if hydatid cysts have ever been met with in the prostate." He is inclined to think "that all cases of hydatid of the prostate are cases of hydatids between the bladder and the rectum, the prostate gland having been more or less absorbed by pressure from an external cyst, so that the latter came at length to occupy the seat of this organ."

Notwithstanding this ingenious argument of Sir Henry Thompson, with which he attempts to throw doubt upon the situation of the tumor, there are three cases which the author has been able to find which seem to correspond with his case and fortify him in the diagnosis which he has felt warranted in making.

Fracture of the Pelvis.—PAUL (*Annals of Surgery*, June, 1901), in reporting fifty-four cases which presented themselves for treatment at the State Hospital, Hazleton, Pa., states that fractures of the pelvis are not common, and are almost invariably due to external violence delivered directly or indirectly upon some portion of the affected structure. Any of the pelvic bones may be broken, and multiple fractures are not unusual. According to some authorities, the pubes is the part most often affected; according to others, the ilium; at any rate fractures of the ischium and acetabulum are uncommon, and of the sacrum and coccyx rare. Compound fractures are rare, but the author's table includes five cases. Pelvic fractures are often comminuted. In dislocations of the symphysis or fractures of the pubes rupture of the urethra is very common; next in frequency comes rupture of the bladder, which may be extraperitoneal or intraperitoneal. Urinary extravasation accompanies the latter, and is often associated with the former, but retention is the usual sequel of urethral laceration. Cases complicated by rupture of the rectum are rare; the author is able to report only one. Rupture of the great vessels in the pelvis is probably more common than is suspected, the symptoms being ascribed to "shock." Contusion or rupture of the kidney is frequently associated with fracture of the ilium. In two cases luxation of the hip complicated the pelvic fracture. Deformity is never well marked. In some cases it is easy to elicit abnormal mobility and crepitus; but in others local tenderness is all that can be found. The prognosis in all cases should be guarded. Simple uncomplicated cases of fractured pubis require rest in the recumbent position, with pressure so exerted as to keep the fragments in apposition. If the pubic fracture be complicated with laceration of the urethra, a catheter should be tied in this canal for several days. Should it be impossible to introduce the catheter an external urethrotomy should be performed. If the bladder is ruptured into the peritoneal cavity, a laparotomy should be done immediately and the rent sutured. If the rupture is extraperitoneal, the bladder should be constantly drained, urinary antiseptics, such as salol and boric acid, administered, and early free incisions made to relieve extravasations. Some cases, especially those in which other portions of the body are injured, will be attended with so much shock as to absolutely contraindicate all operative procedures.

In some cases of fractured ilium the fragments remain in apposition themselves, in others reduction cannot be maintained. Should the broken fragment become united in its abnormal position, loss of function or apparent deformity rarely result. Unless a fragment of the ilium has a tendency to be displaced outward, which is unusual, broad bands of adhesive plaster or muslin should *not* be drawn around the pelvis. Should the upper portion of the acetabular rim be broken off, the head of the femur should be restored to its cavity and extension applied. It is difficult to prevent forward displacement of the lower end of the sacrum where this bone is broken. It is desirable, for various reasons, to avoid inserting packing or canulas into the rectum to prevent this displacement. Malgaigne's hooks, or a modification thereof, applied to the back of the sacrum might prove useful in these cases. Fracture of the coccyx requires usually only rest for its treatment, and should coccygodynia result excision is demanded. The author's table of fifty-four cases includes only one fracture in a woman. Of these cases twenty-seven died, two were improved, and twenty-five were cured.

THERAPEUTICS.

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Use of Drugs in Pulmonary Tuberculosis.—DR. W. R. HUGGARD says that there is a middle course to pursue between that advocated by those who overestimate the power of drugs in the treatment of phthisis and those who underestimate the same. The first point made clear is that up to the present no specific has been found for tuberculosis, and also that there is no drug that is useful in all cases. Nevertheless, there are various drugs that favorably influence the course of some varieties of the disease, always provided that they are well tolerated by the patient, and that they do not cause any disturbance of appetite, digestion, or assimilation. The main objects to be attained are: 1. Improving the general health, as, for example, by arsenic, quinine, strychnine, lime, phosphorus preparations. 2. Increasing the local resistance of the affected tissues, as by the use of creosote and its derivatives, salicylic preparations, and counter-irritants. 3. Modifying the quantity or character of the secretions, as by employment of the balsams, the terebinthinates, the essential oils, morphine and apomorphine, and inhalations, especially of formaldehyde. 4. Controlling systems that react prejudicially on the patient. Among these are: (*a*) Digestive ailments; (*b*) excessive or needless cough, which shakes and exhausts the patient, causes fever, or prevents sleep; (*c*) scanty expectoration and retention of secretions; (*d*) fever, which spoils appetite and prostrates the patient. 5. Removing complications, such as syphilis. The most important point in the treatment is to consider the state of the digestive system. Temperature is the next most important guide to treatment. Pyrexia will in a large proportion of cases yield to absolute rest, bodily and mental, combined with life in the fresh air. In many cases, however, a return to a normal level of temperature can be hastened by the administration of small doses of phenacetin—one to three grains—in combination with quinine and salol and sometimes arsenic. Phenacetin seems to have rather a tonic than a prejudicial effect on the heart and on the general health, and may without hesitation be continued for months, if need be. Next to pyrexia as a guide to treatment should be placed a marked tendency to hæmoptysis. The author thinks that creosote and guaiacol increase the liability to pulmonary hemorrhage—as well, in fact, as to pulmonary inflammation—and should be avoided where such a disposition is present. On the contrary, the lime salts, the terebinthinates, and the balsams have a somewhat restraining influence, as has also morphine in minute doses. Summing up, the author says that the treatment is determined, in the first instance, by the digestive system, by the general health, and by the state of nutrition. If digestion is bad the only drugs indicated are such as will restore it to a normal condition. If digestion is good, the general condition satisfactory, and the patient improving, he refrains from using drugs unless some definite indication is present. Among the most useful indications for drugs are persistent afternoon pyrexia in spite of absolute rest out-of-doors, a tendency to recurrent febrile attacks or to slight inflammatory attacks. This tendency is usually combined with impaired nutrition and with a low state of general health. In these conditions arsenic, strychnine, quinine, and salol are among the most useful tonics. Active softening, excessive cough, overabundant expectoration, and, more rarely, scanty expectoration, expectoration of extremely purulent or nummular character, require attention; and the drugs useful for these conditions generally seem to him to have a favorable influence on the course of the disease in addition to the temporary relief from the discomfort they may afford. Among such drugs are formaldehyde vapor, creosote and its derivatives, except guaiacol carbonate, which the author has found inert, terpin hydrate, oil of cinnamon, myrtol, the balsams, and the lime salts. In sluggish chronic softening, counter-irritation by iodine or by small flying blisters is of the greatest use.—*Medical Press and Circular*, 1901, No. 3250, p. 184.

Atropine and Intestinal Obstruction.—A number of observations have recently been made bearing on the use of large doses of atropine for the treatment of intestinal obstruction. DRS. ARONHEIM, F. H. PRITCHARD, and H GEBELE all discuss this subject. The patient of Aronheim had great pain in the left hypogastrium, and other symptoms of intestinal obstruction developed. One-twentieth of a grain of atropine was given, and was followed by an easing of the pain in one hour, and later by the passage of a large, semi-solid mass of feces. Dilatation of the pupil and dryness of the throat were marked. Pritchard describes a case with similar symptoms in a man, aged sixty-two years. Hot applications and enemata were of no value, and one-thirty-third of a grain of atropine was given in two doses, four hours apart. This was followed by the passage of large movements and the recovery of a large gallstone. Gebele discusses the subject from a critical point of view, and draws less favorable conclusions. He subdivides the cases and states that in the dynamic cases alone is the treatment of avail. The truly mechanical cases are less amenable.—*Münchener med. Wochenschrift*, 1901, No. 33, pp. 1313 *et seq.*

Tuberculosis Treated by Urea.—DR. ARTHUR H. BUCH, following the lines indicated by Harper, already noted in these abstracts, reports some favorable results from the use of urea in both localized and general tuberculosis. The histories of seven patients are given; these include those suffering from tuberculosis of ankle-bones and elbow-bones, with lupus of nostrils, lupus of face, two cases; tuberculous adenitis, two cases; tuberculous joint, and tuberculous cold abscesses. All of these patients were reported as cured.—*Medical Press and Circular*, 1901, No. 3249, p. 163.

Chlorosis Treated by Copper.—DR. E. LIEGEOIS follows out the teaching of Mendini, his predecessor for fourteen years, in employing copper salts in chlorosis, amenorrhœa, and cervical lymphadenitis. The acetophosphate is the form preferred, and in many of the cases under observation for the past twenty-five years marked improvement in the blood condition has resulted.—*Journal des Praticiens*, 1901, vol. xv. p. 225.

Antiseptics and Irritants and Skin Action.—DR. W. D'ESTE EMERY, in a research whose object was to determine the relative irritating power of the various antiseptic and other drugs which are usually applied to the skin, arrives at some important conclusions. The methods by which all fallacies should be excluded and quantitative results obtained gave some difficulty because of the various inherent factors, such as the relative irritant potency of the substance, the strength of the solution, the reflex activity of the nervous system, the area of the skin in which the substance acts, and the length of time during which it is applied. The method of experiment was to use a decapitated frog and to determine the amount of irritant which would cause the well-known skin reflex in this animal. As yet the experiments are incomplete, and a comparatively small number of substances have been investigated, but the following conclusions are of interest: Lysol was the most irritating substance worked with, and represents one hundred on the scale; izal was sixty-six, carbolic acid thirty-eight, mercuric bichloride thirty-one, formalin eight, and alcohol six-hundredths. Thus a lotion of lysol (1 per cent.) will cause as much irritation in the skin of a frog as a lotion of carbolic acid of thrice the strength.—*British Medical Journal*, 1901, No. 2115, p. 112.

Eruptions Due to Orthoform.—DR. W. DUBREUILE reports two separate varieties of eruption consequent to the use of orthoform. These are an erythema, alone or in combination with vesicles, and a rare type of gangrenous eruption. The former is a transitory affair, and may arise when the powder is dusted on the healthy skin. The second type has been observed while varicose ulcers have been under treatment. This type is accompanied by much pain, but is amenable to treatment.—*La Presse Médicale*, 1901, No. 40, p. 340.

Chronic Fluorine Poisoning.—DR. F. SCHWYZER reports in commendable detail an interesting case of chronic fluorine poisoning. The patient was a drinker of large quantities of beer, and it is presumed that the fluorine came from the fluorides of the glass. The subject is a complex one, and is handled in an able manner.—*New York Medical Journal*, 1901, vol. lxxiv., p. 1.

Fusel-oil Poisoning.—DR. THOMAS B. FUTCHER, in an interesting study of this condition, concludes that from the study of the effects of the administration of fusel oil to dogs, and from the observations on two cases of fusel-oil poisoning, the following conclusions may be drawn: 1. Fusel oil, when administered to animals, causes the elimination in the urine of combined glycuronic acid, which reduces alkaline copper and bismuth solutions, and acts as a levorotator to polarized rays. 2. When taken by man it acts as a profound intoxicant, causing unconsciousness of several hours' duration. 3. In one of the cases it was followed by symptoms of hemiplegia. 4. In certain cases, as in one cited, fusel oil is a profound blood destroyer and causes methæmoglobinuria. 5. In both cases it caused transitory nephritis. 6. In both patients a glycosuria lasting two or three days was produced. 7. In the two cases there was fairly conclusive evidence that combined glycuronic acid (*gepaarte glukoronsäure*) was present in addition to glucose.—*American Medicine*, 1901, vol. ii., p. 210.

Critical Review of the Literature of Toxicology.—DR. A. HEFFTER, of Bern, contributes an important critical résumé of the toxicological literature appearing during the years 1897–1900. To those interested this is an important summary.—*Schmidt's Jahrbücher*, 1901, vol. cclxx., p. 151.

OBSTETRICS.

UNDER THE CHARGE OF

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Cæsarean Section for Eclampsia.—In the *Monatsschrift für Geburtshülfe und Gynäkologie*, 1901, Band xiv., Heft 2) SIPPEL discusses the question of Cæsarean section for eclampsia. Recognizing virulent toxæmia to be the cause of eclampsia, he draws attention to the apparent coincidence between the cessation of pregnancy and the cessation of the eclamptic paroxysms. Reasoning from this, he believes rapid delivery is indicated in these cases. Where the cervix is undilated and labor has not begun, he considers Cæsarean section indicated. He believes it to be a less irritating traumatism than incision and dilatation of the cervix. He admits that many cases are unsuitable, and quotes Hillmann's statistics of 40 cases with 19 maternal recoveries, and of 41 children 23 saved.

He reports the case of a primipara, aged seventeen years, who was taken with severe eclampsia five weeks before term. On examination the child was living, in the second position, the smaller fontanelle directed backward and to the right and the cervix undilated. The birth-canal was small and ill developed. To give mother and child the best chance for recovery Cæsarean section was performed. Gauze was placed in the cervix as a drain. The child, although asphyxiated, was resuscitated, and survived.

The mother improved after the operation and the secretion of urine became re-established. She had intestinal hemorrhage, from which she died on the seventh day. An autopsy showed an ulcer of the duodenum as the site of the hemorrhage. The kidneys showed fatty degeneration of the epithelia, and both ureters were dilated.

It is evidently unfair in this case to ascribe death to the results of the operation. The tendency which all eclamptic patients have to bleed from the mucous membranes must be kept in mind in considering the question of the duodenal ulcer.

The Operative Treatment of Collections of Pus in the Uterine Appendages.—MANDL and BÜRGER (*Archiv für Gynäkologie*, 1901, Band lxiv., Heft 1) contribute an interesting paper upon this subject which is of especial interest to obstetricians in view of the treatment of pelvic abscess following puerperal septic infection. The material for this paper included 273 cases in Schauta's practice. The operations adopted in these cases consisted of the removal by laparotomy of pus-containing tubes, the removal of the tubes and uterus by laparotomy, incision and drainage of purulent collections through the abdominal wall, the removal of the uterus and both tubes through the vagina, the removal of a diseased tube through the vagina, with the preservation of the uterus and the other tube, and the opening and emptying of a tubal abscess through the vagina.

The writers report their experience with these various methods with that of other operators. The question of drainage is fully discussed, and also the permanent effects secured by various methods of operation. The writers draw attention to the fact that disease of the Fallopian tubes is rarely unilateral, and that operation which removes one tube only must often be supplemented by a second operation, removing the remaining tube. The writers state a very important general principle which is now recognized by surgeons, namely, that in the presence of fever operation should be deferred if possible. If the patient is growing worse vaginal incision and drainage should be performed. When the patient is convalescent and the pus has become practically sterile, radical operations should be undertaken.

The writers conclude that if possible operations for the relief of abscesses in the uterine appendages should be done through the vagina to avoid infecting the peritoneum. When both Fallopian tubes are involved in suppuration they do not advise removal of both tubes by abdominal section. They believe that the operation is often followed by the unfavorable complications attending abdominal section, and that a permanent satisfactory result is rarely obtained. In cases where the disease is limited to one Fallopian tube, and the surrounding tissues are healthy, such tube may be removed to advantage by abdominal section. It is often necessary in these cases to make a preliminary puncture to ascertain the condition of the pus before operating. Where removal through the vagina offers great technical difficulties abdominal section may be chosen. The removal of both suppurating tubes and diseased tissues is best performed by vaginal section. The permanent results are better and the patient escapes the unfavorable complications of abdominal section. The same ground of reasoning applies to the removal of one Fallopian tube through the vagina as stated with reference to the abdominal operation. Only when the pus contained is known to be sterile is the operation advisable. Vaginal incision cannot be considered as an operation of cardinal value, but as a means for diagnosis and of meeting threatened complications. In exceptional cases abdominal incision and drainage of collections of pus may become necessary.

Pus in Abdominal Operations.—ROBB (*American Journal of Obstetrics*, August, 1901) reports 72 operations for collections of pus in the pelvis. He agrees with others that during an acute attack operation should not be undertaken, but that the patient should be kept quiet on her back in bed and heat applied to the abdomen. A vaginal douche of a gallon of warm 1 per cent. solution of carbolic acid or saturated boric-acid solution is given twice daily. The patient is nourished by nutrient injections and anodynes, and heart stimulants are given if necessary. Should no improvement take place, and a mass be discernible in the pelvis, it is punctured through the vagina and the sac irrigated and packed with sterile gauze.

The micro-organisms found in his cases were staphylococci, streptococci, gonococci, and the colon bacillus. The tubercle bacillus was occasionally seen. The streptococcus was much more deadly than the others, and produced fatal peritonitis. Streptococci may be present when organs are adherent, even when no pus can be demonstrated and cover-slip preparations at the time of operation may fail to show the presence of organisms. The operator should allow a day or two to elapse after operation before performing further operations, to avoid the risk of infection. Gauze packing, the free use of sterile salt solution, the use of the cautery upon pedicles, and leaving warm sterile salt solution in the abdomen, are all means of value in preventing the development of acute infection.

In 49 of the 72 pregnancy had occurred at some time. Infection after labor, or miscarriage, or gonorrhœal infection was the most usual cause of disease in these cases. In 26 the appendix was removed. The operation most frequently performed was the removal of both tubes and ovaries. Hysterectomy was done but once; dilatation and curetting in one-third of the cases; in 9 cases drainage was carried through the cul-de-sac alone; in 2 cases through the abdominal wall alone, and in 1 case through both. In 2 cases in which infection occurred after the original operation the abdomen was opened and drained. Suppuration of the abdominal wall occurred in 12 cases, or 18.7 per cent.

Two patients died, a mortality of 2.77 per cent. In 1 general septic infection following pelvic abscesses was present, and cultures from the lungs showed a pure streptococcus infection. In the second case streptococci appeared in culture tubes two days after operation, and the diplococcus of pneumonia and the bacillus coli communis.

GYNECOLOGY.

UNDER THE CHARGE OF

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Calcification of Fibroids.—GUIBÉ (*Annales de Gynécologie et d'Obstetrique*, July, 1901) reviews the pathology of this condition, which he believes is due to some unknown circulatory disturbance.

While there are no characteristic symptoms, the patient often complains of a sensation of weight, with severe lancinating pains radiating through the loins and downward to the perineum and lower limbs. These are probably due partly to irritation of the peritoneum and partly to stretching of the nerves and uterine ligaments. Pressure symptoms are frequent, especially œdema of the lower limbs. Expulsion of calcified fragments is the only positive evidence of the presence of an intra-uterine growth, though a fetid discharge was present in 25 per cent. of the reported cases.

The prognosis is usually favorable, though deaths from peritonitis and intestinal obstruction have been noted.

The positive recognition of the presence of calcareous degeneration of a fibroid is only possible when a hard body can be felt inside of the uterus or fragments are discharged. Occasionally the characteristic hard tumor can be detected by abdominal palpation. Operation is indicated to relieve marked pressure symptoms and in the presence of peritonitis and intestinal obstruction, the abdominal route being preferred, except in cases of intra-uterine growths.

Ligation of the Uterine Arteries in Cases of Fibroid.—KAKONSHKIN (*La Gynécologie*, June 15, 1901) reports seven cases and analyzes eighty-five others. The immediate results of the operation were quite successful, only one case being a failure. Hemorrhage and pains were relieved, and the tumor usually diminished in size. The best results were obtained in cases of interstitial growths, especially in old patients.

Unfortunately, the results are not permanent on account of the establishment of the collateral circulation, hence ligation of the vessels should be reserved for cases in which the patient is unable to sustain a radical operation or refuses to allow one.

Vaginal Enterocele.—GOUILLOND (*Annales de Gynécologie et d'Obstétrique*, July, 1901) reports a case of posterior vaginal enterocele, which was cured by three operations—shortening of the round ligaments, anterior colporrhaphy, and resection of the posterior cul-de-sac, with posterior colporrhaphy. The writer believes that many cases of posterior vaginal enterocele have been mistaken for extensive rectocele, and operated upon within proper reduction of the hernia and resection of the sac.

Epithelium of the Fallopian Tube.—VOINOT (*Thèse de Paris; La Gynécologie*, June 15, 1901), from careful studies of the anatomy of the tube, arrives at the conclusion that ciliated epithelium is present both before puberty and after the menopause. Before puberty cilia are found most often at the pavilion, less often at the ampulla, and often at the ampulla and isthmus, especially between the folds. After the menopause they are found only at the ampulla. During the period of sexual activity cilia are most numerous, but are disposed in groups, being found most constantly in the depressions between the folds.

Surgical Treatment of Pelvic Adhesions.—OTT (*La Gynécologie*, June 16, 1901) discusses the question of intrapelvic adhesions and the painful symptoms to which they give rise. He believes that it is not sufficient merely to divide or to resect them, since they always tend to re-form.

The operation is performed most easily by making an incision through the posterior vaginal fornix. The adhesions are located, divided, and the raw surfaces are sutured in a direction at right angles to their long axes. The writer reports a considerable number of successful cases. It is important to select them carefully, avoiding those in which there is a possibility of there being suppurative foci.

Decidua Ovarii.—LINDENTHAL (*Centralblatt für Gynäkologie*, 1901, No. 28) affirms that in the second month of pregnancy spaces are seen in the tunica albuginea due to local œdema, which later are filled with cells bearing a close resemblance to those of the decidua. At the seventh month they begin to undergo retrograde changes, some atrophy, but the majority become vacuolated, and are transformed into permanent hyaline tissue. The writer was always able to demonstrate the presence of such islands of hyaline tissue in the ovaries of women who had borne children, but never in those of nulliparæ.

The condition described as superficial papilloma he believes are simply projections of such tissue through the albuginea. Ingrowths of germinal epithelium are cut off by the development of these islands of hyaline tissue, and cavities are formed lined with epithelium, the latter subsequently forming ovarian cystomata, as is well known. Hence the inference that these decidual formations which develop in the ovary during pregnancy are to be regarded as an important etiological factor in the genesis of simple ovarian cysts.

OPHTHALMOLOGY.

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A Case of Bilateral Retinal Detachment During Labor Associated with Albuminuria; Complete Recovery.—HANN and KNAGGS (*The Lancet*, May, 18, 1901) report the case of a woman, aged twenty-one years, who became suddenly affected with blindness after she had been in labor twenty-four hours. There was œdema of the hands, feet, and legs for about three weeks previous. For three hours the pains continued with great intensity, then the patient fell into a state of semi-coma, with stertorous breathing, from which she would be roused by the pains. Labor was terminated by forceps. Three days later an ophthalmoscopic examination made under atropine showed large detachments of the retina filling up the lower third of each globe. They floated up readily on movements of the eyes, and had all the usual characters of detached retinæ. Four weeks later the retinal detachments were no longer to be seen, though there was perhaps some slight appearance of persistence at the very margin. The vision was: right, 6/18; left, 6/12, partly. The fields showed definite contraction in the upper hemisphere. The urine contained a ring of albumin and a trace of sugar, no casts. Two weeks later the vision was : right and left, 6/9 partly. All traces of detachment had disappeared. Given the general tendency to œdema depending upon the renal disease, the mechanical condition affecting the circulation induced by labor was probably quite sufficient to account for the detachment. There was no evidence of renal retinitis. Ophthalmic surgeons must be familiar with cases in which a history is given of eclamptic attacks and of blindness following confinement and ending in recovery. These cases are rarely investigated at the most interesting period, and when they are subsequently seen there is probably nothing found to explain what the exact condition was. Possibly retinal detachment or sudden œdema of the choroid and retina may explain some of them.

The Sometimes Successful Treatment of Cases of Apparently Incurable Blindness.—The age of miracles is not yet passed. Witness the results reported by DR. CHARLES BELL TAYLOR in a clinical lecture with the above title, in *The Lancet*, April 27, 1901. The cases comprise patients who have recovered after many years of apparently hopeless blindness, others who have suffered from and under treatment have recovered from the effects of neuroretinitis, iritis with diffuse scleroderma, hyalitis, detached retina, atrophy of the optic disk, and the results of destructive inflammatory and degenerative changes. "As to remedies outside the usual routine, I should certainly place electricity first; mercury in large doses alone, or in combination with other drugs, second; derivatives, vascular, nervous, or both, third; and lastly, persevering treatment on these lines with such operative procedures as may be indicated." Reports of cases are given; here is one: A man, aged thirty-five years, was sent to be taught a trade in a blind asylum; he had lost his sight from severe optic neuritis; the disks were white and blurred, and he could not tell day from night; he had been treated with the usual remedies, and the case seemed hopeless. Powerful galvanic currents were applied daily and sometimes twice a day. Result: he was able to resume his former occupation of house painter, and he can now (twelve years later) read the newspaper in a bad light, and distant vision is perfect.

The following cases illustrate the statement that mercury, "this much-abused remedy alone or in combination is simply marvellous:" A girl, aged fifteen years, was quite blind from iritis and parenchymatous keratitis; no iris or pupil visible, the eyes were simple opaque masses; mercury in large doses for four years; perfect recovery. A myopic peer (sic) had suffered from iridochoroiditis with effusion into the vitreous, no reflex from either eye, but detachment of the retina was suspected by the writer. Within a month's treatment by galvanism, large doses of mercury, massage, pilocarpine, and derivatives he recovered excellent sight, as good as he had ever had, and which continued until his death many years later. The lecturer had three additional almost identical cases, and many others which differed only in small details. Among the former a "distinguished journalist" and a "well-known merchant."

Finally, a number of cases are reported to illustrate the good effect of operation combined with treatment on above lines. These cases yield in no respect to those previously detailed. It is difficult to select from *embaras de richesses*. The case of the "son of a member of Parliament" is a type.

The Action of Becquerel and Rontgen Rays Upon the Eye.—F. HIMSTEDT and W. A. NAGEL (*Annal. d. Physik.*, Fol. iv., p. 537). Preparations of radium emit, according to Becquerel, so-called invisible rays. Giesel had already found that a combination of radium enclosed in paper impervious to light and laid upon the eye excites a faintly luminous sensation, filling the entire eye. Himstedt and Nagel now show that this sensation is due to fluorescence of the solid and fluid media brought about by the radium rays. The sensation is very like that occasioned by the ultra-violet rays, whose action as exciters of fluorescence has been previously shown. These observers, like Dorn and Brandes, also obtained localized light effects from the Röntgen rays, but unlike those occasioned by the Becquerel rays, which take the form of a diffuse faint light. As a matter of fact, the Röntgen rays effect no fluorescence of the refractive media. More rarely, and thus far unexplained, is the fact that the Röntgen as well as the Becquerel rays give an impression of greatest intensity in that part of the eye exactly corresponding to the point of excitation; thus, if the rays enter the eye from above, the superior part of the retina is excited, whereas ordinarily the sensation is projected to the opposite extremity of the diameter, passing through the nodal point, for rays coming above the projection point is below.

The prepared eye of the frog shows, as is well known, a current which changes upon entrance of light from rest to action current of activity. The ultra-violet rays, as already proven, occasion the same phenomena, and, as Himstedt and Nagel now show, the same is true of the Röntgen rays.

PATHOLOGY AND BACTERIOLOGY.

UNDER THE CHARGE OF

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The Finer Changes in the Peripheral Portion of Divided Nerves.—MURAWIEFF (*Ziegler's Beiträge*, 1901, vol. xxix. p. 102) found the formol-methyl method of great service in the study of both normal and pathological nerve fibres. This method was devised several years ago by Rossolimo and Murawieff.

The fresh nerve is placed in a 4 per cent. formalin solution, where it should remain not less than two or three days. It is then transferred to 95 per cent. alcohol for twenty-four hours, but never longer than forty-eight hours.

Tease out a small piece of nerve and stain for ten to fifteen minutes in a one-half per cent. aqueous solution of methylene blue, which is heated until the first bubbles appear. Cool the solution and move the tissue into aniline oil for one-half second (aniline oil, 1 part; 95 per cent. alcohol, 9 parts), then into 95 per cent. alcohol for one-half second. Clear in cajuput oil. Place the bits of nerve on a slide and add a drop of Canada balsam. Tease the nerve fibres thoroughly and cover the preparation with a cover-slip. If one wishes to make a cross-section of the nerve, then, after hardening in the 4 per cent. formalin, place it in 95 per cent. alcohol twenty-four hours; then in absolute alcohol twenty-four hours. Embed in celloidin. Stain in the manner already described.

When a normal nerve is treated according to this method the medullary sheath is seen to be studded with small, dark blue granules, which are distributed uniformly. They are approximately of the same size, except near the nodes of Ranvier, where there are larger granules or small masses. The granules are arranged in two concentric rings; one close to the axis-cylinder, the other near the periphery of the medullary sheath. Although Murawieff made a careful study of the granules, he was not able to determine whether they exist in the myelin sheath of the lining nerve fibre or whether they are the result of post-mortem changes.

The author studied the changes in the peripheral portions of nerves after division. His observations were made on rabbits and guinea-pigs. The absorption of the myelin forms the essential part of the "degeneration" of the nerve fibre. It is due to the cessation or very great reduction of the synthetic processes in the myelin. Chemical changes appear later. They exhibit marked variations and cannot in any case play the chief part in the process of "degeneration."

The nuclei of Schwann's sheath and the protoplasm surrounding them show great vital activity. The nuclei increase in size and in number, and the protoplasm increases markedly. This rapid growth is explained partly by the increased supply of food material to the cells in part, probably in consequence of the disturbance of the tissue equilibrium and a certain irritation produced by the degenerating myelin. The nuclei multiply and the protoplasm increases markedly. The growth of the latter becomes so excessive that nourishment fails, and it undergoes fatty degeneration and then necrosis.—[J. H. P.]

The Etiology of Cancer. V. LEYDEN (*Zeitsch. f. klin. Med.*, 1901, vol. xliii., p. 1) examined the ascitic fluid from a girl, aged sixteen years, with a malignant ovarian tumor. The fluid was cloudy, and in it were many peculiar cells which were motile. These cells protruded long protoplasmic processes, and fat granules in the cells moved into these processes. The cells did not possess powers of locomotion. V. Leyden believed that these cells were protozoa and were accidentally present, but since has found similar cells in ascitic and pleuritic fluids in cases of cancer, and now believes that they are characteristic of cancer.

Cultures from bits of fresh cancer were made upon a culture medium of fuscus crispus, and in six to eight days well-developed amœbæ were found.

In cabbage occurs a peculiar growth (Kohlhernie) analogous to "human cancer," due to the action of a parasite. In sections of this growth inclusions are found in the cells like those seen in cancer cells.

V. Leyden examined sections of cancer of the breast and axillary lymph nodes, and saw in cell protoplasm spherical bodies, with a dark staining centre, surrounded by a clear space which does not stain. He thinks that these bodies resemble protozoa. He believes they do not arise from the nucleus, and are not degenerations, but are amœbæ. He saw in one cell an appearance like that of a sporocyst.

V. Leyden has not seen the various intermediate stages of development. He believes they are not yeasts, for yeasts grow between and not in cells.

[V. Leyden describes the familiar cancer-cell inclusions. He claims that these inclusions are protozoa purely on morphological grounds. He has not been able to cultivate the organism or produce tumors by inoculating them. He does not prove the identity of his "motile" cells with the cancer-cell inclusions. He has no evidence that his "motile" cells are protozoa or the cause of the epithelial-cell growth. His article is valueless as evidence of the parasitic nature of cancer]. [E. H. N.]

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